Vol. 42 No. 6

BULLETIN

OF THE

TORREY BOTANICAL CLUB

JUNE, 1915

Some new species and varieties of Bihai*

ROBERT F. GRIGGS

(WITH PLATE 19 AND SIX TEXT FIGURES)

For a number of years the writer has contemplated publishing a revision of the musaceous genus *Bihai*. Inasmuch as this has been much delayed, it has been thought wise not to withhold the publication of the several new species which have come to light in the course of the work. In order to enable the student rightly to place the new species among the old a key to all the species is also given. The preparation of this in turn has involved the revision of the subgenera and minor groups which is herewith presented.

Intrageneric Relationships.—In previous treatments the species have been grouped under two subgenera, which under somewhat varied characterizations included respectively the large species and the small species. The first of these to receive a name, *Taeniostrobus*, was founded by Kuntze on his *B. imbricata*. Baker, however, ignored Kuntze's name and included this species under his own subgenus *Platychlamys*, with *B. Bihai* as type, which was taken as synonymous with *Taeniostrobus* by Schumann and replaced by it. The narrow bracted species were thrown together by Baker under the name *Stenochlamys* (type *B. psittacorum*) and this was adopted by Schumann. While one recognizes a more or less natural subdivision of the genus around these types there are no characters by which it can be so divided without tearing

* Contribution from the Botanical Laboratory of the Ohio State University, No. 89.

[The BULLETIN for May (42: 247–314. *pl. 12–18*) was issued May 22, 1915.]

asunder closely related species, such for example as *B. longa*, *B. pendula*, and *B. marginata*, which though very closely related, differ in size and width of the bracts so much that they are necessarily thrown into different subgenera by the key characters. As one goes through the genus he finds so many difficulties of this sort that it becomes clear that some other method of subdivision is necessary. A new classification is therefore proposed which while retaining the old subgenera as recognizable primary subdivisions, even if they are somewhat indefinitely characterized, is mainly built around smaller groups of rather closely similar species. The names of these groups have been taken from the specific names of characteristic species, indicating therefore categories of lower rank than the subgenera with their substantive designations. Before proceeding to the key it may be well to outline this proposed classification.

TAENIOSTROBUS

EPISCOPALES, including only *B. episcopalis*.

IMBRICATAE, including *B. conferta*, *B. Wagneriana*, *B. imbricata*, *B. densa*, *B. reticulata*, *B. punicea*, *B. Mariae*, and *B. curtispatha* (intermediate).

PENDULAE, including *B. rostrata*, *B. longa*, *B. revoluta*, *B. pendula*, *B. Collinsiana*, *B. villosa*, *B. platystachys*, and *B. marginata*.

CHAMPNEIANAE, including *B. Bihai*, *B. Champneiana*, *B. barqueta*, *B. borinquena*, *B. rutila*, *B. purpurea*, *B. stricta*, and *B. humilis*.

STENOCHLAMYS

DISTANTES, including *B. velligera*, *B. metallica*, *B. spissa*, *B. dasyantha*, *B. tortuosa*, *B. geniculata*, *B. librata*, *B. adflexa*, *B. lingulata*, *B. distans*, *B. latispatha*, *B. brasiliensis*, *B. acuminata*, and *B. Burchellii*.

CANNOIDEAE, including *B. glauca*, *B. densiflora*, *B. angusta*, *B. crassa*, *B. aurantiaca*, *B. straminea*, *B. Harrisiana*, *B. hirsuta*, and *B. psittacorum*.

Key to the species of Bihai

1. Branch-bracts closely imbricated forming a compact spike ..... 2.
1. Bracts standing apart, distant or slightly overlapping when in flower ..... 11.
2. Bracts persistent (IMBRICATAE) ..... 3.

2. Bracts deciduous, strictly ascending, scarlet with yellow margins.
B. episcopalis (Vellozo) Kuntze.
3. Inflorescence 25 cm. broad at base....4.
3. Inflorescence about 15 cm. broad....5.
4. Rachis straight, leaves rounded to the base...*B. conferta* (Peters.) Kuntze.
4. Rachis somewhat flexuose, leaves cuneate, very inequilateral.
B. Wagneriana (Peters.) Kuntze.
5. Inflorescence erect or "suberect"....6.
5. Inflorescence pendulous....8.
6. Leaves green, inflorescence peduncled....7.
6. Veins and veinlets conspicuously marked with red, inflorescence sessile, close to the ground, red and yellow....*B. reticulata* Griggs.
7. Inflorescence 15 cm. wide, bracts 10 cm. long....*B. imbricata* Kuntze.
7. Inflorescence scarcely exceeding 10 cm. in width, middle bracts 4–5 cm. long.
B. densa Griggs.
8. Bracts suborbicular, widest at the middle, rose red, plant very large....10.
8. Bracts ovate, widest below the middle, medium sized plants....9.
9. Inflorescence deltoid, somewhat loose, red purple....*B. punicea* Griggs.
9. Inflorescence oblong, dense, scarlet....*B. densa* Griggs.
10. Bracts closely imbricated, concealing the rachis, flowers rose colored where exposed....*B. Mariae* (Hook. f.) Kuntze.
10. Bracts touching only at the middle, not concealing the rachis, flowers yellow.
B. curtispatha (Peters.) Kuntze.
11. Inflorescence pendent (PENDULAE)....12.
11. Inflorescence erect....20.
12. Bracts broad, nearly as wide as long when flattened out....13.
12. Bracts narrow, not more than half as wide as long....15.
13. Bracts rhomboid, widest at the middle, close and slightly imbricated.
B. curtispatha (Peters.) Kuntze.
13. Bracts ovate, widest below the middle, spaced out on the rachis....14.
14. Rachis rather short, bracts rather close, margined with green, suddenly narrowed above the strongly rostrate tip, plant below medium size.
B. rostrata (Ruiz & Pavon) Griggs.
14. Inflorescence very long, bracts remote, scarlet, bright rufous pubescent within, gradually narrowed to the tip, plant very large.... *B. longa* Griggs.
15. Bracts scarlet, flowers yellow....16.
15. Bracts variegated, red with yellow edges....18.
16. Bracts only slightly concave, margins revolute....*B. revoluta* Griggs.
16. Bracts boat-shaped, not revolute....17.
17. Peduncle, rachis and bases of bracts ferruginous-pubescent, rachis strongly flexuose, leaves typically green beneath....*B. pendula* (Wawra) Kuntze.
17. Glabrous throughout, rachis nearly straight, leaves heavily glaucous.
B. Collinsiana Griggs.
18. Peduncle and inflorescence densely villous with long bright rufous hair, flowers white....*B. villosa* (Klotzsch) Kuntze.
18. Inflorescence merely puberulent....19.
19. Plant large, rachis nearly straight, middle bracts exceeding 10 cm., flowers reddish.
B. platystachys (Baker) Griggs.
19. Plant of medium size, rachis strongly flexuose, middle bracts less than 10 cm. long.
B. marginata Griggs.

20. Rachis about 2 cm. in diameter, bracts glabrous, thick and fleshy, shriveling much in drying (CHAMPNEIANAE) ..... 21.
20. Rachis seldom exceeding 1 cm. in diameter, bracts mostly chartaceous, shriveling little ..... 30.
21. Inflorescence long-peduncled, scarlet ..... *B. Bihai* (L.) Griggs.
21. Inflorescence sessile ..... 22.
22. Bracts of one color ..... 23.
22. Bracts variegated ..... 26.
23. Flower with a subgibbous expansion on the anterior side, filaments strongly bent, petals of nearly the same texture as the sepals ..... 25.
23. Flower merely arcuate, petals very delicate, shorter than the sepals ..... 24.
24. Inflorescence orange ..... *B. Champneiana* Griggs.
24. Inflorescence rose colored ..... *B. barqueta* (Loes) Griggs.
25. Inflorescence orange ..... *B. borinquena* Griggs.
25. Inflorescence scarlet ..... *B. borinquena coccinea* Griggs.
26. Bracts margined with yellow ..... 27.
26. Bracts red and green ..... 28.
27. Bracts red and yellow, narrowly ovate, about 6 cm. wide, barely touching each other, perianth 5 cm. long, posterior sepal broadly lanceolate. *B. rutila* Griggs.
27. Bracts purple and yellow, 8–10 cm. wide, close together, perianth segments 6 cm. long, linear-oblong ..... *B. purpurea* Griggs.
28. Bracts scarlet with green margins, few, plant rather small (2 m.), leaves scarcely exceeding 1 m. ..... 29.
28. Bracts green with a patch of red on the cheeks, more numerous, plant up to 4 m. tall, leaves elongate, cuneate-oblong ..... *B. elongata* Griggs.
29. Bracts very broad, 6 cm. deep, plant about 1.5 m. tall, flowers tipped with white. *B. stricta* (Huber) Griggs.
29. Bracts about 3 cm. deep, larger, flowers colorless below, green where exposed. *B. humilis* (Jacq.) Griggs.

30. Medium sized plants, leaves commonly surpassing 50 cm., habit musoid or submusoid (DISTANTES) ..... 31.
30. Small plants, commonly about a meter tall, if taller very slender, leaves about 30 cm. long, habit cannoid (CANNOIDEAE) ..... 46.
31. Not villous ..... 32.
31. Inflorescence thickly covered with very long hair. *B. velligera* (Poepp.) Kuntze.
32. Leaves green or glaucous, bracts colored ..... 33.
32. Leaves purple beneath, bracts green ..... *B. metallica* (Planch. & Linden) Kuntze
33. Inflorescence persistently hairy ..... 34.
33. Inflorescence glabrous unless when young ..... 37.
34. Inflorescence long peduncled, bracts more or less twisted out of the distichous arrangement ..... 35.
34. Inflorescence sessile, bracts distichous, prevailingly yellow ..... *B. spissa* Griggs.
35. Bracts solid red ..... 36.
35. Bracts green with red cheeks, flowers yellow. *B. dasyantha* (Koch. & Bouché) Kuntze.
36. Bracts ovate-lanceolate, flowers green, only their tips exserted. *B. tortuosa* Griggs.

36. Bracts narrowly lanceolate, flowers yellow, geniculate, standing out of the bracts at anthesis.....*B. geniculata* Griggs.
37. Bracts slightly concave, their edges revolute.....38.
37. Bracts boat-shaped, not revolute.....39.
38. Middle bracts about 15 cm. long, yellow with purple tips.
B. lingulata (Ruiz & Pavon) Griggs.
38. Middle bracts about 7 cm. long, scarlet, inflorescence long peduncled.
B. adflexa Griggs.
39. Perianth 15–20 mm. long, inflorescence deltoid, compact...*B. librata* Griggs.
39. Perianth 30–60 mm. long, inflorescence oblong, rather lax.....40.
40. Inflorescence orange.....41.
40. Inflorescence red.....42.
41. Flowers exserted, rachis very flexuose, bracts, at least the lower, strongly falcate.
B. distans Griggs.
41. Flowers and their bracts entirely included, rachis and bracts nearly straight.
B. latispatha (Benth.) Griggs.
42. Bracts reaching 15 cm. in length.....43.
42. Bracts 5 cm. long, all deflexed, flowers golden yellow.
B. Burchellii (Baker) Griggs.
43. Flowers straight or slightly arcuate, not closely appressed nor suddenly erected.44.
43. Perianth geniculate at anthesis, flowers numerous but opening one or two at a time, appressed to the channel of the bracts until near anthesis, then quickly raised by a bend in the pedicel, bracts scarlet, horizontal, three ranked, of very diverse ages.....*B. geniculata* Griggs.
44. Margins of bracts not involute, flowers reddish (or yellow), habit cannoid.
B. acuminata (Rich.) Kuntze.
44. Margins of the bracts involute, all arcuate ascending, flowers greenish white..45.
45. Leaves green beneath.....*B. brasiliensis* (Hook.) Kuntze.
45. Leaves glaucous.....*B. brasiliensis pulverulenta* (Hook.) Griggs.
46. Bracts as brightly colored as the rachis, leaves green on both sides.....47.
46. Bracts and flowers yellowish green, rachis and pedicels red, leaves glaucous.
B. glauca (Poit.) Kuntze.
47. Bracts exceeding 10 cm. in length.....48.
47. Bracts, unless the lowest, scarcely reaching 10 cm.....50.
48. Bracts spreading at flowering time, not involute, flowers not tipped with black.49.
48. Bracts strictly ascending at flowering time, involute and bayonet pointed, flowers tipped with black.....*B. densiflora* (Verlot) Kuntze.
49. Leaves narrowly oblong, flowers white, pedicels orange.
B. angusta (Vellozo) Griggs.
49. Leaves elliptical, flowers reddish (or yellowish), pedicels red.
B. acuminata (Rich.) Kuntze.
50. Flowers not darkened at the tip, yellow.....51.
50. Flowers maculate.....53.
51. Bracts red.....52.
51. Bracts orange, leaves mostly petioled.....*B. crassa* Griggs.
52. Bracts somewhat ascending, rachis green, leaves about 30 cm. long, sessile, subcordate, peduncle short, flowers pale yellow.
B. aurantiaca (Ghiesb.) Kuntze.
52. Bracts all deflexed, leaves reaching 60 cm., rounded at the base, peduncle elongated, flowers golden yellow.....*B. Burchellii* (Baker) Griggs.

53. Inflorescence brightly colored.....54.
53. Inflorescence greenish yellow, pubescent.....*B. straminea* Griggs.
54. Bracts not particolored.....55.
54. Bracts scarlet above, greenish yellow below.....*B. Harrisiana* Griggs.
55. Bracts scarlet, concave, acute.....56.
55. Bracts orange, revolute and scarcely concave, obtusish.
B. psittacorum (L. f.) Kuntze.
56. Inflorescence pubescent.....*B. hirsuta* (L. f.) Griggs.
56. Inflorescence glabrous.....*B. hirsuta cannoidea* (Rich.) Griggs.

FIG. 1. *Bihai densa* Griggs; three-eighths natural size.

Bihai densa sp. nov.

Plant of medium size, petiole 70 cm. long, leaf 80 cm. long, 30 cm. wide, acute, subcordate at the base, thin and tough, main veins 5–10 mm. apart, green and glabrous except the midrib and petiole which are pilose with projecting ferruginous hairs about 1 mm. in length; inflorescence erect (?), 18 cm. high, half as wide, oblong, nearly 1 cm. thick (dry), nearly glabrous, peduncle 20 cm. long in the type, somewhat shriveled but 1 cm. thick, rachis nearly straight, concealed, except at the very base, stiff; bracts ascending, fifteen in the type, scarlet, thick and firm, shriveling little, broadly ovate, rostrate, inclined to be involute at the tips, the lowest standing somewhat apart, the rest closely imbricated, middle

bracts 4–5 cm. long, 5–6 cm. wide, widest near the base; flowers about a dozen to a bract, only their tips visible, bracteoles delicate, 30 × 12 mm., flower very small, perianth 20–25 mm., sepals pubescent, thick, indurated at the tips, the posterior 2–3 mm. longer than the other floral parts, petals 3, pedicels finally about 12 mm., berries 9 mm. in diameter (dry) concealed within the bracts. [TEXT FIG. 1.]

PANAMA: around Dos Bocas, Rio Fató Valley, province of Colon, altitude 40–80 m., in dark shady forest, August 16, 1911, *H. Pittier*. Type in National Herbarium, sheet 678445.

Bihai densa is nearest *B. punicea* from which it differs especially in the shape and color of the bracts, and the flower characters. The only one of the previously known species which could be mistaken for either is *B. imbricata*.

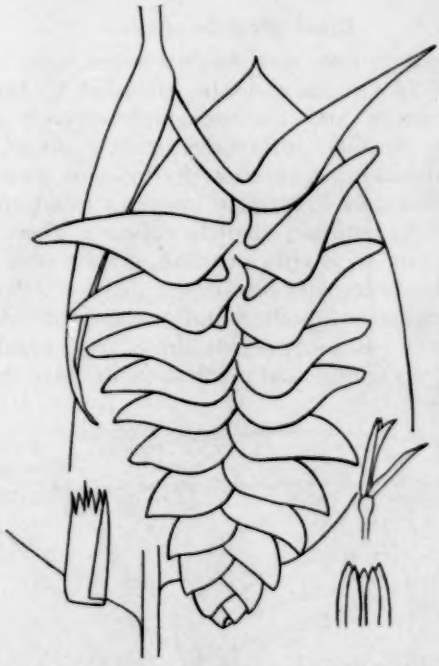


FIG. 2. *Bihai punicea* Griggs; three-eighths natural size.

Bihai punicea sp. nov.

Plant of medium size, leaf about 1 m. long, 25 cm. wide, green and glabrous, acute; inflorescence pendent, deltoid, about 12 cm. wide, a little longer, peduncle 30 cm. long, 7 mm. thick (dry),

glabrous, rachis nearly straight, stiff, glabrescent, concealed above but visible below, bracts twenty-three in the type, mostly horizontal, red-purple, covered with tawny hair, boat-shaped, ovate when opened out, widest near the base, slightly arcuate, very obtuse, except the lower, those from the middle of the inflorescence about 5 cm. long, of the same breadth, the lowest 14 cm., the highest only about 1.5 cm.; flowers a little shorter than the bracts, less numerous than in allied species, bracteoles ample, 40 × 25 mm., obtuse and frayed at the tip, persistent, flowers curved up out of the bracts toward the large sepal, perianth about 3 cm. long, lateral sepals free, corolla limb tridentate, the middle tooth smaller than the other two. [TEXT FIG. 2.]

PANAMA: between Gorgona and Gatun, altitude 10–50 m., Smithsonian Biological Survey, January 7, 1911, *H. Pittier 2290*. In National Herbarium, sheets 677161, 676544, 676545.

Bihai revoluta sp. nov.

Plant of medium size, leaf (known to me only from a sucker) elliptical, 50 × 15 cm., acuminate, rounded to the slightly decurrent base, green and glabrous; inflorescence pendent, red, rachis straight, flexible, internodes mostly about 3 cm. long, covered with abundant evanescent ferruginous tomentum, bracts numerous, horizontally divaricate, more or less tomentose at the base, linear-oblong, obtuse, slightly concave, their margins conspicuously revolute soon after opening, middle ones about 12 cm. long, 2 cm. wide: bracteoles persistent, about 1 × 5 cm., glabrous, flowers rather numerous, pedicel and ovulary red, perianth yellow, glabrous, about 5 cm. long, sepals thick, free, petals two (in the type), shorter by 2–3 mm. and much more delicate than the sepals. [TEXT FIG. 3.]

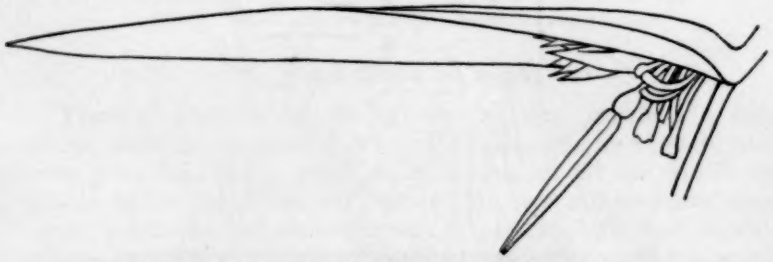


FIG. 3. *Bihai revoluta* Griggs; about half natural size.

COLOMBIA: Santa Marta, 1898–1901, *H. H. Smith 2315*, with the following field note: "Thickets and forest near streams, 3,500–5,000 feet. Bract and pedicel red, flower yellow. Specimen is from Manzanares, 3,500 feet, March 1." Type in the herbarium

of the New York Botanical Garden; specimens seen also from the Missouri Botanical Garden and from the National Herbarium. The following station may likewise be recorded: Orizaba, MEXICO, *Botteri 523*.

The narrow revolute bracts of this species at once differentiate it from all other known species except *B. lingulata* and *B. adflexa*. There is, however, no close resemblance between the stiff erect inflorescence of *B. adflexa* and the lax panicle of the present species. The resemblance to *B. lingulata* is much closer, but that species has yellow bracts and a compact inflorescence with internodes only one third as long.

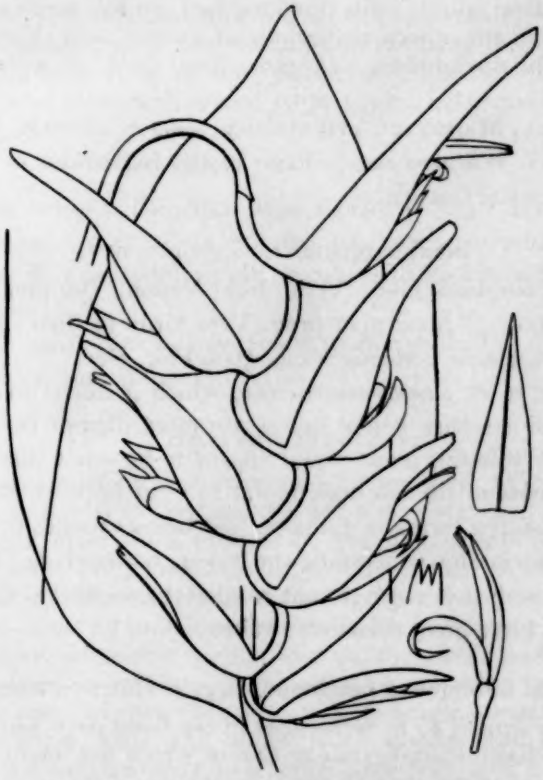


FIG. 4. *Bihai marginata* Griggs; about three-sevenths natural size.

Bihai marginata sp. nov.

Plant about 4 m. tall, trunk 6 cm. in diameter at base, petiole 50 cm. long, leaf blade 60 × 15 cm., oblong, acute, rounded at the

base, green and glabrous on both sides; inflorescence pendent, less than 20 cm. long in the type, 10–12 cm. wide, exposed portion of the peduncle less than 10 cm. long, slender, about 5 mm. in diameter, softly puberulent with light brown hair, rachis strongly flexuose in smooth curves, stiff, minutely puberulent, internodes about 25 mm. long, bracts eight in the type, all reflexed, scarlet with yellow margins, somewhat puberulent, shallowly boat-shaped, ovate-lanceolate when flattened out, gradually narrowed to an obtuse tip, those in the middle of the inflorescence 8–9 cm. long, 4 cm. wide; flowers rather numerous, the younger pushing the ripening fruit out beyond the edges of the branch bracts, bracteoles 60 × 15 mm., triangular-lanceolate, very acute, pubescent on the back, persistent in fruit, perianth 5 cm. long, curved toward the larger sepal, lipped, sepals all free, corolla limb three-toothed, middle tooth somewhat smaller than the others, pedicel about 15 mm. long in fruit, berry (apparently ripe) oblong, 15 mm. long, half as wide. [TEXT FIG. 4.]

PANAMA: Marraganti and vicinity, 3–60 m. altitude, April 3–9, 1908, *R. S. Williams 696*. Type in the herbarium of the New York Botanical Garden.

Bihai barqueta (Loes) comb. nov.

Heliconia barqueta Loes, Verh. Bot. Verein. Brandenburg **51**: 18. 1909. "Mexico in prov. Vera Cruz in distr. Jalapa ad fluvii ripam. in coffeeto Sel. n. 3609 Flor. Dec."

Closest to *B. Champneiana* from which it differs in the rose-colored inflorescence whose bracts are more distant than in that species. While this plant would appear to be safely distinct from *B. Champneiana* the relations found to exist between the orange and red bracted forms in Jamaica (see below) makes it desirable to have information concerning the flower characters not furnished by the description since recent studies have shown that these characters have great diagnostic value.

Bihai borinquena coccinea Griggs & Harris, var. nov.

Closely similar to *B. borinquena* in the floral parts but differing in the brilliant scarlet-crimson bracts which are numerous and somewhat narrower than in the typical form of the species.

JAMAICA: cultivated at Hope Gardens, *W. Harris*. Pressed specimens in the herbarium of the New York Botanical Garden.

It is of interest to add in this connection that the orange-

bracted *Bihai borinquena* is common in Jamaica along with the red-fruited variety. This Jamaican plant differs but slightly from the Porto Rican type. From it, thanks to formalin specimens and very beautiful colored drawings made by Mr. Harris's assistant, Miss H. A. Wood, I am able to describe the flower which, by a typographical error, was stated to be 11 cm. long in the original description:

Flowers about fifteen, bracteoles yellow, firm when fresh, ovate-triangular, enveloping the flower; ovulary yellow, perianth 6 cm. long, white below, green on the exposed tips, bent somewhat toward the posterior sepal, with a conspicuous subgibbous expansion on the anterior side, filaments conspicuously bent into the expansion, perianth segments free above but partially fused below, staminode about 3 cm. long, reaching to the bend in the filaments; berry dark blue, 10 × 13 mm., pedicel stout, fleshy, ringed, about 25 mm. long at maturity, seed 10 × 4 mm., tubercled, horny.

Bihai stricta (Huber) comb. nov.

Heliconia stricta Huber, Bol. Mus. Goeldi 4: 543. 1906.

TYPE LOCALITY: "Esta especie é bastante frequente nas fraldas do Cerro de Couchahuya; ella é cultivado no horto botanico do Museu Goeldi."

Bihai stricta is evidently closest to *B. humilis* but differs in the much wider branch-bracts.

Bihai adflexa sp. nov.

Plant of medium size, leaves 60–80 cm. long, 15–20 cm. wide, oblong, narrowed to the base, tip not seen, green and glabrous on both sides, main veins prominent, 5–7 mm. apart: inflorescence deltoid, stiffly erect, peduncle apparently elongated, about 8 mm. in diameter, glabrous, rachis stiffly zigzag, puberulent, middle internodes about 15 mm. long, bracts twelve in the type, all ascending, scarlet, somewhat puberulent on the back, narrow, linear-oblong, obtuse, revolute, little concave, strongly bent upward near the base, whence the name, middle bracts about 7 cm. long, scarcely 2 cm. wide, the upper much smaller, the lower much larger: flowers numerous, bracteoles persistent, 4 × 1 cm., with a thin evanescent pubescence both within and without; perianth 4 cm. long, sparingly pubescent like the bracteoles, sepals free, corolla limb three toothed. [TEXT FIG. 5.]

GUATEMALA: Coban, altitude 1,600 m., in deep forest, June

1908, *H. von Tuerckheim II 2356*. Type in the herbarium of the New York Botanical Garden.

The very narrow revolute bracts at once distinguish *B. adflexa* from all other species of the genus except *B. lingulata* and *B. revoluta*.

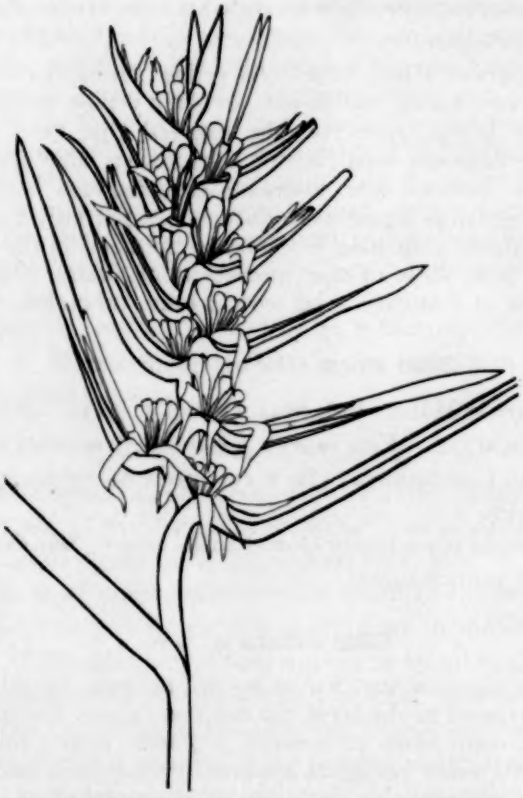


FIG. 5. *Bihai adflexa* Griggs; about half natural size.

There is small likelihood of its being confused with *B. revoluta* with its elongated, lax, pendent inflorescence. The resemblance to *B. lingulata* is closer but that species has larger, yellow inflorescence with wider bracts. It is, moreover, Peruvian.

Bihai brasiliensis pulverulenta (Lindl.) var. nov.

Heliconia pulverulenta Lindl. Bot. Reg. **19**: *pl. 1648*. 1833.
Hook. Bot. Mag. **78**: *pl. 4685*. 1852.
Bihaia pulverulenta Kuntze, Rev. Gen. Pl. **2**: 685. 1891.

In every detail except its slightly inferior size and its heavily farinose leaves *B. pulverulenta* corresponds precisely with *B. brasiliensis*. Although recognizing that glaucescence was sometimes evanescent and variable in amount, I have heretofore supposed that marked differences in this matter were sufficient criteria of specific distinctness. But the correspondence between these two species is so exact in every other respect that one has no other recourse than to throw them together. A specimen brought back from Rio de Janeiro by the United States Exploring expedition under Captain Wilkes is very interesting in this connection. It has the typical inflorescence of the two species; some of the leaves are cordate but others are narrowed to the base; some of them were clearly green and glabrous but others show evident signs of a heavy pulverulence which has been rubbed off except in a few protected spots! The reason that the similarity of the two plants was not recognized long ago is that glaucescence was made a primary character in the key so that they were never put close enough together to invite comparison.

Bihai angusta (Vellozo) comb. nov.

Heliconia angusta Vellozo, Fl. Flum. Text 107. 1825. Plates 3: 20. 1827.

Heliconia bicolor Benth. Maund's Botanist 3: *pl. 101*. No date, 1837–1840? Regel, Gartenflora 5: 289. *pl. 172*. 1856.

Heliconia angustifolia Hook. Bot. Mag. 75: *pl. 4475*. 1849.

Bihai straminea sp. nov.

Plant rather small, erect, habit cannoid, leaves reaching 35 cm. in length and 10 cm. in breadth, smaller in the type, the upper, at least, sessile, elliptical, acuminate, round at the base, glabrous, green on both sides; inflorescence erect, pale greenish yellow, peduncle glabrous, about 18 cm. long in the material seen, 2–3 mm. thick, rachis somewhat zigzag, minutely puberulent, internodes 10–15 mm.; bracts half a dozen or less, ascending, glabrous unless at the base, narrowly triangular, concave and boat-shaped, straight sided, widest at the base, acute, 3–10 cm. long, the largest about 12 mm. broad, tips of the lowest exceeding the uppermost: flowers few, bracteoles about 15 mm. long, less than 5 mm. wide, caducous after anthesis, glabrescent; pedicel, ovulary and calyx thickly and softly pubescent, perianth about 3 cm. long, with a

dark spot near the tip, strongly bent toward the large sepal somewhat as in *B. geniculata*, large sepal rolled back in flower, lateral sepals almost completely fused with the corolla or free, pedicel about 15 mm. (not mature). [TEXT FIG. 6.]

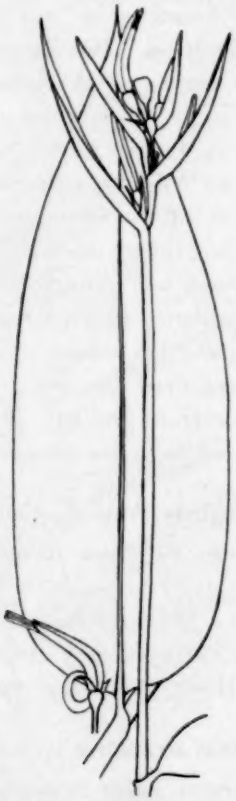


FIG. 6. *Bihai straminea* Griggs; about half natural size.

PANAMA: dry wooded hills around Alhajuila, prov. Panama, altitude 30–100 m. (Smithsonian Survey), January 11, 1911, *H. Pittier 2328* (type in the National Herbarium, sheet 677138); between Miraflores and Corazal, Canal Zone, altitude 20–30 m. (Smithsonian Survey), January 3, 1911, *H. Pittier 2200*.

Bihai Harrisiana sp. nov.

Erect, up to 4 m. tall, habit cannoid, leaves sessile, up to 30 cm. long and 11 cm. broad, broadly elliptical, acuminate, round

at the base, green and glabrous: inflorescence erect, glabrous, peduncle of variable length, rachis somewhat flexuose, internodes about 15 mm. long, bracts few, the lowest fertile one scarcely 10 cm. long, the upper about 6 cm., all about 15 mm. wide, narrowly lanceolate, obtuse or some of them acute, particolored, upper half bright crimson fading into greenish yellow below; flowers few, bracteoles about 20 × 7 mm., early deciduous, perianth 25–30 mm. long, posterior sepal red, fading into orange on the edges and tip, conspicuously spotted with black at the tip, lateral sepals free, red, petals two, sometimes with the rudiment of a third, red, fading into green on the tip, pedicels 10–15 mm. long. [PLATE 19.]

JAMAICA: Leicesterfield, Upper Clarendon, *W. Harris 10841*, February 28, 1910; with the field note, "1,800 ft. alt. An erect growing plant with reed like stems up to 12 feet high, basal third of stems leafless, lower half of bracts orange yellow, upper half bright crimson, rhizome stout, creeping, flowers scarlet, tipped with green and white." (Type in the herbaria of the Ohio State University and the New York Botanical Garden; also cultivated in Hope Gardens, Jamaica.) "Jamaica, *Wilson*"! in Herb. Gray.

In addition to the information contained on the label Mr. Harris has favored me with a letter describing the habitat of the plant in greater detail as follows: "With regard to the new species from the Upper Clarendon I might say that it is fairly plentiful—usually in light shade but sometimes in the open. When growing in shade or partial shade the stems are usually twice as high as those growing in open situations. The most luxuriant clumps I saw were growing in partial shade near the edges of small streams, whilst plants in the open were yellowish in appearance and did not look happy. It is evidently a shade and moisture-loving plant.

"I saw some old stems this year that were fully 2 or 3 feet higher than the specimens measured by me last year, and it would be correct to give the height as 'up to 12 feet or over' and the habitat might be given as the 'upper reaches of the Rio Minho Valley, Upper Clarendon, 1,200 to 2,000 feet altitude.'"

It is a great pleasure to be able to associate with this beautiful species the name of so able and indefatigable a botanist as William Harris.

A dried specimen of *B. Harrisiana* would not ordinarily be distinguished from *B. hirsuta cannoidea* but in well dried material

it is evident that the scarlet of the ends of the bracts does not extend below the middle. The leaves, too, are larger and more broadly oval than in any of the specimens of the variety *cannoidea* (or related species) which have come under my observation while the stature far exceeds anything else recorded in the *Cannoideae*.

Bihai hirsuta (L.f.) comb. nov.

Heliconia hirsuta L.f. Suppl. 158. 1781.

TYPE LOCALITY: "Habitat in America Meridionali."

IMPERFECTLY KNOWN SPECIES

The following species have also been described recently, but the descriptions given are so lacking in diagnostic characters as to make it inadvisable to assign them places in the key:

HELICONIA ROBUSTA Pax; Fedde, Rep. Nov. Sp. **7**: 107. 1909

TYPE LOCALITY: "Bolivien Wälder um San Carlos bei Mapiri 700 m. (Buctien n. 1267 flowered July 1907)."

This plant is evidently one of the *Pendulae* but the description is inadequate either to differentiate it from previously described species or to identify it with them.

HELICONIA PEARCEI Rusby, Bull. N. Y. Bot. Garden **6**: 494. 1910

"Probably at Santa Ana" (Bolivia).

Said to be "about intermediate between *H. psittacornu* [*psittacorum*] and *H. brasiliensis*." From the description, however, it would appear almost identical with *B. acuminata*.

Explanation of plate 19

BIHAI HARRISIANA Griggs

The figures, natural size, were drawn from specimens flowering in the Hope Gardens, Kingston, Jamaica, by Mr. Harris's assistant, Miss H. A. Wood.

The ferns and flowering plants of Nantucket—XV

EUGENE P. BICKNELL

SOLANACEAE

PHYSALODES PHYSALODES (L.) Britton.

Nicandra physalodes (L.) Pers.

Waste lots and yards on the eastern side of the town. Still in full flower late in September, 1899. At Edgartown, Martha's Vineyard, I have seen it in bloom as early as July 1 and as late as October 12.

*PHYSALIS HETEROPHYLLA Nees.

Siasconset, a few sterile plants in a mowed field, September 16, 1899.

*PHYSALIS PRUINOSA L.

In waste ground, scarce, and undoubtedly introduced. Mrs. Flynn has sent me for examination specimens collected by her August 25, 1904, in early bloom, and October 2, 1902, in flower and fruit. On Martha's Vineyard and on Chappaquiddick Island, it is frequent as a garden weed and in soil that has been under cultivation, but I saw it nowhere in surroundings that at all conveyed the suggestion that it might be indigenous. Identification of this and the foregoing species confirmed by Dr. Rydberg.

Note.—Mr. Floyd has informed me that Mr. Dame, in a letter to Mrs. Owen, reported that *Physalis peruviana* L. had appeared at Gibb's swamp in several flourishing colonies in 1895, after an extensive brush fire. No specimens are known to have been preserved.

SOLANUM NIGRUM L.

Frequent by street sides and in waste places in and near the town and occasional in other parts of the island; sometimes in the rubbish back of pond shores. Plants very small June 17, 1910, first flowers June 27; remains in flower through September. Common on Martha's Vineyard.

The more usual form of this plant on Nantucket is only slightly pubescent, and has more or less zig-zag and wing-angled stem and branches; the leaves are ovate to lanceolate, often rhombic and attenuate, cuneately narrowed into rather short petioles, and entire to openly low sinuate or irregularly dentate, usually with acutish teeth, the lower surface minutely appressed pubsecent; inflorescence subumbelliform, the flowers 2–6, on strigillose pedicels; corolla white, yellowish-green at the center; calyx lobes ovate-oblong to oblong, becoming 2–3 mm. long, loosely spreading or recurved in fruit; anthers 1.5–2 mm. long, the filaments slightly pubescent; ovary pubescent; style not protruding; berry becoming over 1 cm. in diameter; seeds 1.5 mm. broad. On Martha's Vineyard I have collected a much smaller variety, reduced and more delicate in all its parts; also a larger form, with purplish-tinged flowers.

***Solanum peregrinum** sp. nov.

Similar to *Solanum nigrum*, duller green, rather low, branched from the base, the stem and branches slightly if at all zig-zag, somewhat angled but not winged, roughish with scattered incurving hairs or, above, like the younger parts of the plant, clothed with a whitened strigose pubescence; leaves rather strongly venose, thinly roughish pubescent on both surfaces with loosely appressed hairs, the veins strigose; blades broadly ovate, obtuse, abruptly contracted to slender petioles, sometimes slightly cordate or subhastate, prevailingly deeply dentate with prominent, often regular, obtuse or rounded teeth; inflorescence corymbiform, the flowers six to nine, on finally reflexed strigose pedicels; corolla white, 3–4.5 mm. long, the lobes ovate-oblong, obtuse, densely pubescent on the outer surface, finally recurved; calyx lobes short, 1–1.5 mm., broadly ovate or triangular, usually only obscurely veined, loosely spreading in fruit; anthers pale yellow, 2–2.5 mm. long, the filaments bearded, 1 mm. or more in length; ovary densely white pubescent; style slightly exserted; berry black, becoming 8 mm. in diameter, the seeds 2 mm. broad.

Street sides and waste places in Nantucket where it is rather more common than *S. nigrum*, at least in the town; Surfside; Siasconset. In full flower July 14, 1912; continues in bloom through September. Not seen on Martha's Vineyard. Type: Nantucket street, September 12, 1899, deposited in the herbarium of the New York Botanical Garden.

This plant is evidently introduced on Nantucket and its native habitat is unknown. Whatever may be its history there seems little reason to doubt that it has been included in the species *Solanum nigrum*. Nevertheless I have not found that its characters properly correspond with those of any one of the numerous varieties that have been described of this wide-ranging and polymorphic species. Among the extensive series at the New York Botanical Garden the following are to be referred to *S. peregrinum:*

MONTANA: Columbia Falls, September 17, 1894, R. S. Williams. FLORIDA: Pensacola, August 6, 1901, A. H. Curtiss, "No. 6863, Second distribution of plants of the Southern States," labeled "*S. nigrum* var. *Dillenii*," a very different plant. SWITZERLAND: August 28, 1897, S. L. Clarke.

Solanum nigrum, as now generally accepted, is unmistakably a composite species, and in the subdivision which it must sometime receive the precise application of the collective name will be a matter for very critical determination. The ordinary Nantucket form agrees closely with the description of "true *S. nigrum*" as understood by Dr. Gray.* From this *S. peregrinum* is clearly distinct showing obvious differences throughout—duller green color, coarser pubescence, straighter and less angled stem and branches, shorter and broader, deeply dentate-lobed leaves, the blades abruptly contracted into longer petioles, corymbiform instead of umbelliform inflorescence, broader divisions of the corolla, larger anthers, bearded filaments, shorter calyx lobes, larger seeds.

Comparison of *S. peregrinum* with the type of *S. interior* Rydberg† shows it to be quite distinct from that western species.

SOLANUM DULCAMARA L.

Neglected places in the town; cedar thicket at Monomoy; among pines near Miacomet Pond; the Thorn lot and at several stations on the western side of the island. First flowers June 28, 1912; in full bloom June 15, 1910; late flowers and well fruited September 10, 1907.

LYCIUM VULGARE (Ait. f.) Dunal.

Occasional in waste ground and along fences in and near the

* Syn. Fl. 2[1]: 227–228.

† Bull. Torr. Club 31: 641, 1905.

town, and at one place on the harbor shore. In full flower May 30, 1909, June 15, 1911, mid-September, 1899.

DATURA STRAMONIUM L.

Infrequent and apparently never of very strong growth on Nantucket. A few small plants at Siasconset, below the bluff, in 1899, 1904, 1912; small plants by the railroad in Nantucket, 1904; waste ground south of the town September 16, 1907, in full flower.

*DATURA TATULA L.

One small plant in a town barnyard September, 1899; a solitary plant by a streetside in full flower August 10, 1906.

Note.—Petunia axillaris (Lam.) B. S. P. is occasionally to be seen as a transient waif in the town streets.

SCROPHULARIACEAE

VERBASCUM THAPSUS L.

Nowhere abundant, but scattered over the island in dry open places. Spikes beginning to show June 18, 1908; first flowers June 26, 1910, June 28, 1912.

*VERBASCUM PHLOMOIDES L.

Two stout plants together on a bank at Siasconset, June 13, 1908, in full flower, thus earlier blooming by over two weeks than the closely related *Verbascum Thapsus*.

VERBASCUM BLATTARIA L.

Seen only in a grassy yard on North Water Street, September 10, 1907, a number of fruiting plants, and two still in bloom, their flowers white. Mrs. Owen has recorded it from a single station in Nantucket and from Siasconset. It is thus not less scarce today than it was thirty years ago, and is one of a number of common and widely distributed weeds that on Nantucket do not seem to find conditions favorable to their spread.

*CYMBALARIA CYMBALARIA (L.) Wettst.

Linaria Cymbalaria Mill.

Established along old walls at several places in the town. Just in bloom June 16, 1911; in full flower June 5, 1912.

LINARIA LINARIA (L.) Karst.

Linaria vulgaris Hill.

Another one of our common weeds that does not make headway on Nantucket. I have met with it there on only three occasions: in 1899, at Siasconset, a few plants together; in 1904, a single patch on the south shore at the site of the old Surfside hotel; and in 1912, by the Wauwinet road in Squam, a small colony in full flower July 12. As far back as 1888, Mrs. Owen reported it as "not infrequent on the edge of the town," where today, if it has not died out entirely, it must be extremely scarce. It occurs on Tuckernuck and is frequent on Martha's Vineyard, but seems to be absent from Chappaquiddick Island.

LINARIA CANADENSIS (L.) Dumort.

One of the common plants of sandy and sterile soils. First flowers May 30, 1909, June 4, 1911; in full flower June 7, 1908; continues to bloom well into September.

*SCROPHULARIA LEPORELLA Bicknell.

Scarce. In September, 1899, a colony of some twenty plants, the tallest nearly five feet high, grew at the border of a thicket in Squam. Five years later, and many times since then, this station was searched for in vain; probably none of the plants had survived the encroachment of the woody growth that had at first given them protection. Not until 1910 was the species seen again when two spindling flowerless plants were found at Watt's Run. The next year much of it, in full flower on June 9, raised its tall stems along a low shore thicket in Quaise, and on July 5, 1912, a group of some fifteen plants were in full flower in low open ground near Miacomet Pond. Collected in a yard on West Silver street July 1, 1911, by Miss Grace B. Gardner. It occurs on Martha's Vineyard, there being two stations on Chappaquiddick Island.

It is interesting that the wide variation in leaf form to which this species is subject may be seen in its extremes in the small and isolated colonies found on Nantucket. In plants rising side by side the leaves of one may be evenly close-serrate, of the other coarsely and irregularly laciniate, or even doubly laciniate, with salient triangular to lanceolate-attenuate teeth. Even this ragged-

ness of outline may be sharply accentuated by a more prominent tooth here and there standing forth quite out of line with its fellows either at right angles to the axis of the leaf or actually recurved.

The plants of these coastal islands compared with those of more hilly country inland show a marked tendency toward a different form of corolla, the tube wider, even campanulate, with its upper lip abbreviated and with short rounded lobes, much like that of the western *S. occidentalis*, to which this species is evidently very closely related.

GRATIOLA AUREA Muhl.

Abundant on wet shores and in low grounds, as well as in many fresh water ponds, where it develops after the manner of a true aquatic producing lengthened and attenuate semi-pellucid leaves. Young plants beginning to appear May 30, 1909, and June 8, 1910; mostly less than one inch high June 17, 1910; in full flower August 7, 1906, and until after the middle of September. On Martha's Vineyard I have seen it in flower as early as June 26 (1913) and as late as October 8 (1909).

ILYSANTHES DUBIA (L.) Barnhart.

Ilysanthes gratioloides Benth.

Infrequent. Shores of Sachacha Pond; at several stations near Siasconset; Maxcy's Pond; pool on Madequet road. Still in flower September 12, 1907, September 16, 1899.

LIMOSELLA TENUIFOLIA Hoffm.

Abundant on the wet sandy shores of ponds on the south side of the island, especially Hummock Pond; also at Sachacha Pond. Here, and at Miacomet Pond, it may be seen growing beneath the water with elongated attenuate leaves, some of them 10 cm. or more in length. Ordinarily the leaves are mostly 2–4 cm. long and very narrowly linear, either obscurely spatulate or tapering to an obtuse tip. Not yet in flower May 31, 1909; in full flower June 17, 1908, continuing in bloom through September.

*VERONICA OFFICINALIS L.

A small patch in full flower on a lawn on Main Street, June 16, 1911, doubtless introduced.

*VERONICA SERPYLLIFOLIA L.

Infrequent and possibly introduced. Damp fields westward from the town at several stations; Grove Lane; Crooked Lane; Millbrook swamp. In full flower May 31, 1909, June 11, 1911.

*VERONICA PEREGRINA L.

Apparently of very recent introduction. It grew in profusion in a neglected yard at the Springfield House, June 11, 1911, in flower and fruit, but has not been seen anywhere else.

VERONICA ARVENSIS L.

Frequent by streetsides in the town; abundant on a lawn on North Water street, 1910; dry open thickets in Shawkemo, Polpis, and Millbrook swamp. In full flower May 30, 1909, June 7, 1908, June 27, 1910.

*VERONICA TOURNEFORTII Gmelin.

Near Sea Cliff Inn, June, 1893, Mrs. Mabel P. Robinson; Brant Point road "abundant and seemingly established" 1896, Mrs. Maria L. Owen, fide F. G. Floyd.

*VERONICA TEUCRIUM L.

Grove Lane, one plant, 1897, Miss Elizabeth S. Kite, fide F. G. Floyd. An estray from farm house gardens at several places on Chappaquiddick Island. In full flower in September.

*AUREOLARIA PEDICULARIA (L.) Raf.

Gerardia pedicularia L.

A colony of scattered plants in full flower September 16, 1899, in an open growth of scrub oak a mile or more northeast of Siasconset. I have not seen it since on Nantucket, although it is locally common on Chappaquiddick Island, where it continues in bloom sometimes to the middle of October. Doubtless referable to Dr. Pennell's variety *caesariensis*, although no specimens are now at hand for verification.

AGALINIS PURPUREA (L.) Britton.

Gerardia purpurea L.

Common in low grounds, either in damp soil, fresh or brackish, or on dry sandy levels, blooming in August and September and later. The corolla varies much in size and is largest and most pubescent in stout and somewhat fleshy horizontally wide branched

plants of brackish soils which also develop relatively large broadened capsules; the largest corollas seen were 3.8 cm. long and of equal width.

*AGALINIS PAUPERCULA (A. Gray) Britton.

Gerardia paupercula Britton.

Flowering specimens collected August 16, 1906, in damp places in the hills south of Polpis, have been determined by Dr. F. W. Pennell. I met with it nowhere else on Nantucket where it can scarcely be other than a scarce and local plant.

AGALINIS MARITIMA Raf.

Gerardia maritima Raf.

Locally common in many salt marshes along the north shore of the island; the Creeks; Swain's Neck and Bache's Harbor; Eatfire; Pocomo; Coskaty; Little Neck. Blooms in August and September.

*** Agalinis acuta** Pennell, sp. nov.

"Annual. Plant light green, not tending to blacken in drying. Stem 1–4 dm. tall, simple or moderately branched, rather conspicuously striate four-angled. Leaves opposite, linear, slightly to moderately scabrous above; those of the stem 1–2.5 cm. long, 0.6–1.3 mm. wide. Pedicels slender, in flower 5–15 mm. long, in fruit 12–20 mm. long, 1–2(–3) times the length of the bracts. Calyx-tube 3 mm. long, evidently reticulate-veiny (firmer in texture than in *A. decemloba*), ⅔–¾ the length of the capsule, its lobes 0.5–1 mm. long, triangular-acuminate, not or scarcely callose. Corolla 10–13 mm. long, membranous, its tube 7–9 mm. long, its lobes 3–4 mm. long, retuse to emarginate, all spreading; within pubescent below sinus and over entire width of basal portions of posterior lobes; posterior lobes ciliate, anterior finely ciliolate; "rose-pink" (not seen fresh). Filaments lanose toward apex, anterior more densely so; anther-sacs lanose with white hairs on the valvular surface, glabrous on the sides. Style glabrous. Stigma 1–1.2 mm. long. Capsule 3.8–4.2 mm. long, ovoid, yellowish-brown. Seeds 0.4–0.6 mm. long, triangular-rounded, turgid, yellowish-brown; testa finely reticulated.

"Type: dry sandy downs, Edgartown, Martha's Vineyard, Massachusetts, collected in flower September 12, 1901, M. L. Fernald, 45 in United States National Herbarium; cotypes in Gray Herbarium and Herbarium New York Botanical Garden.

"Flowers, late-August to October. Fruit, late-September to October. Dry sandy soil, rare or locally frequent in the Coastal Plain, Cape Cod region of Massachusetts, Nantucket, Martha's Vineyard and Long Island, westward as far as the Hempstead Plains; very occasional inland (above the Fall-Line) in eastern Massachusetts, Rhode Island and Connecticut.

"Differs from *Agalinis decemloba* (Greene) Pennell, which occurs from Lancaster County, Pennsylvania, to northern Alabama, by its lower habit, pedicels mostly 1–2 (not 2–3) times the length of the bracts, calyx-tube campanulate (not hemispheric), firmer in texture, $\frac{3}{5}$–$\frac{3}{4}$ (not $\frac{3}{5}$–$\frac{2}{3}$) the length of the capsule, calyx-lobes 0.5–1 mm. (not 0.05–0.2 mm.) long, not or scarcely callose, and its seeds smaller, 0.4–0.6 mm. (not 0.6–0.8 mm.) long, strongly (not obscurely) reticulated.

"Differs from *Agalinis Skinneriana* (Wood) Britton, which occurs from the St. Clair River, southwestern Ontario to eastern Kansas, by its less conspicuously striate-angled stem, angles glabrous or nearly so (not scabrellous-roughened), its corolla-lobes more or less emarginate (not truncate), stigma 1–1.2 mm. (not 1.5–2 mm.) long, capsule 3.8–4.2 mm. (not 4–5 mm.) long, and seeds smaller, 0.4–0.6 mm. (not 0.7–0.9 mm.) long." *Francis W. Pennell.*

A characteristic autumn-flowering plant of the dry plains in the southern half of the island; on the north side observed only in Pocomo. In full flower September 2, 1904, continuing in bloom through the month. Common also on the south side of Martha's Vineyard and on Chappaquiddick Island. Well grown plants become much branched and 3 dm. in height; diminutive examples may be not over 2 cm. high with only a terminal flower.

Comparison of Nantucket specimens collected in 1904 with Wood's type of *Gerardia Skinneriana* in the herbarium of Columbia University, to which species the New England plant had long been referred, showed that they were not at all the same; and when, through the kindness of Professor Greene, I received specimens of his then recently described *Gerardia decemloba*, from Washington, that more nearly related plant was readily seen not to be identical. Dr. Pennell's studies in this group have brought him quite independently to the same conclusion, and have shown further that our eastern plant, and *A. decemloba* as well, are

distinct from the more southern *Agalinus parvifolia* (Chapm.) Small, to which both had been recently referred.

SCHWALBEA AMERICANA L.

Mrs. Owen's catalogue contains the record of all that is known of this plant on Nantucket: "Plains opposite Bloomingdale; rare, L. L. D. Plants of luxuriant growth but few in number." It has never been reported by any other collector than Mr. Dame.

PEDICULARIS CANADENSIS L.

Frequent in dry thickets and open ground throughout the eastern side of the island from Pocomo and Squam to Siasconset; Quaise; near Madequecham Pond. Observed in full flower from June 4 to 15.

MELAMPYRUM LINEARE Lam.

An inhabitant of dry thickets and copses on the eastern side of the island from Shimmo and Shawkemo to Squam and Siasconset. Just in flower June 2, 1909, June 7, 1908; still in bloom July 11, 1912.

LENTIBULARIACEAE

UTRICULARIA MACRORHIZA LeConte.

U. vulgaris var. *americana* A. Gray.

Reed Pond; Maxcy's Pond; pool west of the town; reported from Polpis by Mrs. Owen. In flower at Reed Pond June 8, 1908, June 18, 1910, July 3, 1912, September 10, 1907.

UTRICULARIA GEMINISCAPA Benj.

U. clandestina Nutt.

In a ditch on Swain's Neck, also in Polpis; not seen in flower. "Ditches in Polpis choked with it." M. L. O. catalogue.

UTRICULARIA INTERMEDIA Hayne.

"A single non-flowering specimen in Reed Pond. Morong, 1887." M. L. O. catalogue.

SETISCAPELLA SUBULATA (L.) Barnhart.

Utricularia subulata L.

Taupawshas swamp in open places among masses of cranberry, both in wet spots and in merely damp soil, July 6, 1912, just in flower. Reported by Mrs. Owen in her catalogue from Tom

Never's and Gibb's Ponds, where it was collected by Mr. Walter Deane (see Rhodora, 6: 160).

SETISCAPELLA CLEISTOGAMA (A. Gray) Barnhart.

Utricularia cleistogama Britton.

Mrs. Owen, in her catalogue, has reported her discovery of this diminutive plant on Nantucket, where she had found it in abundance in a part of Tom Never's swamp and also at Almanac Pond. Flowering specimens, sent by Mrs. Owen, as I am informed by Professor Fernald, are preserved in the Gray herbarium together with a letter from their collector dated August 28, 1881. The citation of the plant from Nantucket in the sixth edition of Gray's manual evidently rests on this material.

Although now held to be a species distinct from *S. subulata* it cannot be said of this plant that it is yet conclusively known to be anything more than a reduced state of that species. Whatever the truth may be the two plants do not always show that wide diversity in their corollas that, by comparison of typical examples, does undoubtedly seem to attest them as distinct. Near Edgartown, on Martha's Vineyard, on September 30, 1912, there fell to me a most favorable opportunity of observing the extent of variation natural to the flowers of *S. cleistogama* among the plants of a single colony. The situation was a few square feet of damp sandy soil in open ground. In the weakest examples, some of them not over 1 cm. high, the corollas, "not larger than a pinhead," were subglobose or saccate, and white or faintly bluish in color, precisely as descriptions require them to be. But in stronger plants the corollas increased doubly in size and came also, by an exact gradation, to a distinctly two-lipped form, the blunt lower lip dusky or purplish lineate and with an evident white spur, the most open flowers showing an unmistakable yellowish tinge. The spur, obsolete in the smallest corollas, varied in the larger ones from rounded to oblong and acutish; in one instance it was bifid.

In very small examples of *S. subulata*, unmistakable as to identity because components of colonies of the typical plant, the corolla, perhaps from arrested development, may be somewhat abortive and reduced to a fraction of its normal size, and is sometimes palest yellow, or even whitish with a faint bluish tinge.

Such plants were collected on Martha's Vineyard, near Lambert's Cove, July 1, 1913.

OROBANCHACEAE

*THALESIA UNIFLORA (L.) Britton.

Orobanche uniflora L.

Probably not uncommon, although not previously reported from Nantucket. On June 4, 1909, when it was in full flower and therefore easily noticeable it was found along the foot of Rattlesnake bank, and also by a low thicket in Shawkemo and on an open sandy hillside eastward towards Polpis.

Note.—The beech-drops, *Leptamnium virginianum* (L.) Raf., grows in association with almost all the groups of beech trees on Chappaquiddick Island, and is abundant at several stations and of strong growth, some plants attaining a height of 5 dm. On Nantucket I have never missed an opportunity of seeking it wherever beech trees were seen but always without success. It seems altogether probable, however, that some day it will be discovered there.

BIGNONIACEAE

*CATALPA CATALPA (L.) Karst.

Catalpa bignonioides Walt.

Small trees not over three feet in height, were observed, in 1904 and 1906, scattered among an extensive growth of pines east of the town; a single small tree among introduced pines at Wauwinet, 1912.

PLANTAGINACEAE

PLANTAGO RUGELII Dcne.

Reported in Mrs. Owen's catalogue as "very scarce" and found, by Judge Churchill and Mr. Dame, only at two stations at the southern end of the town. I did not succeed in finding it until 1907 when, in September, a few flowering plants were observed in a shaded yard on Broad Street. Two years later it had become established by nearby streetsides at several places, and was also seen in a farmyard south of the town and at as far distant a point as a thicket in Shawkemo.

PLANTAGO MAJOR L.

A weed of roadsides, old fields and waste places. July to September.

*PLANTAGO HALOPHILA Bicknell.

A characteristic plant of salt marshes and brackish shores, sometimes extending along roadsides. Flowering during August and September.

PLANTAGO LANCEOLATA L.

Excessively abundant in fields and grassy places everywhere. Dark green glabrate plants and paler and narrower leaved very hairy forms, mainly of poorer soils, constitute markedly divergent varieties of this species. Forms with dark, ovate, compound heads are frequent, as well as sharply contrasting forms having the spikes linear and elongated. Blooms from May until October.

PLANTAGO DECIPIENS Barneoud.

Frequent or, locally, rather common in salt marshes and along shores, blooming from August through September.

*PLANTAGO ARISTATA Michx.

A few plants on Little Neck, September 10, 1904, in flower and fruit; near Brant Point, September 13, 1907; one plant in a waste yard June 27, 1910; a scattered growth in a dry field in Shawkemo, in full flower July 1, 1912. Abundant and evidently long established on Martha's Vineyard, and also extending all along the sandy roadway that crosses Chappaquiddick Island, but on Nantucket apparently of only recent introduction.

RUBIACEAE

HOUSTONIA COERULEA L.

Abundant throughout, not only in low moist places but also over the dry plains and commons, and to the tops of the exposed rolling hills. In the southwest quarter of the island it even overspreads the sandy wastes near the shore, in association with *Sisyrinchium arenicola*, these being the most noticeable plants flowering there in early June. In full flower May 30, 1909; it continues quite generally in bloom into July, and produces belated flowers in August and even in September.

Large flowered forms having white, brightly yellow-eyed corollas, with relatively short, evenly graduated tube, seem to answer quite exactly to the description of var. *Faxonorum* Pease & Moore.

HOUSTONIA LONGIFOLIA Gaertn.

Recorded by Mrs. Owen from "near Long Pond. L. L. D[ame]." No other collector has reported it. About Long Pond are conditions of soil and surroundings suggestive of localities on Long Island where this is a characteristic plant, but I have not succeeded in rediscovering it on Nantucket where, if it occurs today, it must be of extreme rarity.

CEPHALANTHUS OCCIDENTALIS L.

A common shrub of wet swamps and the borders of muddy ponds. Leaves appearing June 7, 1911, June 8, 1908; flower heads less than half size July 4, 1912; still in bloom September 10, 1907.

MITCHELLA REPENS L.

A scarce plant on Nantucket where I have met with it only twice. In 1910 a small patch was discovered in a dense thicket near the head of Tom Never's swamp, and a few plants in a secluded spot at Beechwood, in Polpis. It had not flowered at either station. Mrs. Owen has reported it from Trot's swamp and from Polpis.

*GALIUM ERECTUM Huds.

On Grove Lane, June 28, 1912, a large mass in full flower.

*GALIUM APARINE L.

Everywhere in shaded thickets on banks and in low grounds. In full flower May 30, 1908, May 31, 1909; well fruited June 28, 1912; by midsummer only the withered stems are to be found. Varies remarkably in proportions and in the size of the leaves and fruit.

GALIUM PILOSUM Ait.

Frequent, especially in the northwestern quarter of the island. Not yet in flower June 26, 1910; past flowering and with mature fruit September 2, 1904. Varies from densely pubescent to almost glabrous, the more pubescent forms occurring in exposed

sandy places and in pure sand. The glabrate plants are not common and are found in more protected situations among open growths of scrub pines. Their stems are shining and sometimes quite glabrous, their leaves hispidulous ciliate on the margins and on the midrib beneath, var. *puncticulosum* (Michx.) T. & G.

GALIUM TRIFLORUM Michx.

Frequent in shaded thickets on the eastern side of the island, especially in Squam, Shimmo and Polpis. In full flower and with young fruit August 13, 1906. As elsewhere two forms may be distinguished, the leaves of one narrow and tapering, of the other broadened and rounded or abruptly narrowed to the cuspidate apex.

GALIUM CLAYTONI Michx.

Common in low grounds flowering from the middle of June through September.

The ordinary form of this bedstraw is a small plant of damp or wet open places often where the soil loses much of its moisture or becomes quite dry in summer. In partial shade, or in very wet situations, which encourage a vigorous growth throughout the season, it comes to an enhanced phase of development that gives it quite the aspect of being a different species. Nowhere have I seen this larger state of the plant of more pronounced character than on Nantucket.

The more common smaller form of the plant is very scabrous and of a pale green color, not readily discoloring when pressed; the leaves are often firm with revolute margins, those of the stems sometimes reduced to fours and only 8–10 mm. long and 1–2 mm. wide; the minute flowers of three- or, not rarely, four-parted corollas, are in pedunculate clusters of three on short finally divergent pedicels 2–5 mm. long, and the fruit is 1 mm. or less in diameter. The larger form is only slightly scabrellous and is thin leaved and deeper green in color, turning dark or black on the herbarium sheet. In its luxuriance of growth along ditches and in very wet spots it sometimes forms close masses 6 dm. or more in height, from which it is possible to disentangle individual plants as much as 13 dm. in length. The leaves, in whorls of six on the stems and four on the branches, are narrowed into evident petioles, and be-

come as large as 3 cm. long and 6 mm. wide; the corolla, 1.5–2 mm. in expanse, is four-parted or, in smaller flowers, three-parted, the lobes either acute or obtuse; the fruit 1–1.5 mm. in diameter, is borne on slender spreading pedicels sometimes fully 12 mm. in length which are disposed to be arcuate and slightly scabrous. Smaller and narrower leaved plants having pedicels of this character so closely simulate *Galium trifidum* L. that they might easily be misidentified. It would be hard to believe of these divergent phases of *Galium Claytoni* that they were other than well-defined species, were it not that the gradation from one to the other is gradual and complete and did not as many examples lie midway in the range of variation as at either extreme. Almost the same extent of variation in the species may be observed on Long Island and about New York. If it be thought expedient to recognize the larger form by a name we have for it the varietal designation *Galium Claytoni* var. *subbiflorum* Wiegand (Rhodora 12: 228–230. 1910).

It could be wished that the name *Galium Claytoni* were better accredited in its application to this plant for which we have come to use it. A careful reading of Michaux's description leaves little doubt in my own mind that his *G. Claytoni* was no other plant than the *G. trifidum* of Linnaeus. Michaux was particular to emphasize of his species that its leaves were in fours or, rarely, in fives, never in sixes, thus meeting exactly the case of *G. trifidum;* and it is further suggestive in his description that the rather ambiguous phrase "*fasciculus ramorum terminalibus*" at once becomes clear and at the same time diagnostic of *G. trifidum*, if we may understand it to mean that, except at the ends of the branches, the flowers were solitary. Upon these indications, and others not necessary now to bring forward, there would seem to be little reason to doubt that the species we have been calling *Galium Claytoni* has never received a name proper to its own identity, unless, indeed, it should bear the name *Galium tinctorium* L., now otherwise appropriated. Bigelow and some others of our earlier botanists took this view, that is to say, their descriptions make it plain that this name was understood by them as applying to the larger phase of the plant now called *G. Claytoni;* and, as a matter of fact, the description of *G. tinctorium* in Species Plantarum

undoubtedly applies better to this plant than to the species that has come to bear it, and which Bigelow described as *Galium obtusum*. It is to be hoped that there may be still in existence original specimens by which the true application of these names may be made clear.

On Nantucket the smaller form of *G. Claytoni* comes into bloom rather earlier than the larger one—June 15, 1908, June 18, 1910; the latter showed its earliest open flowers June 26, 1910.

Galium tinctorium L. (*G. obtusum* Bigelow) occurs on Martha's Vineyard and is to be looked for on Nantucket.

*GALIUM PALUSTRE L.

Abundant in the meadows about Shawaukemmo Spring, where, in June and early July, it is conspicuous from its clustered masses of white bloom about springy places and along runs and rills; also found near Abram's Point. Just in flower June 8, 1911; in full bloom June 25, 1910, July 1, 1912. Flowers cymulose clustered, the corollas spreading 2–5–4.5 mm., four-parted, the lobes acute; flower buds often purplish-pink or rose color.

Note.—Galium circaezans Michx. is included, by name only, in Mrs. Owen's list. It is not known that it has ever been collected on Nantucket.

*SHERARDIA ARVENSIS L.

In full flower all through the short grass of a lawn on Chester street, June 15, 1910.

CAPRIFOLIACEAE

SAMBUCUS CANADENSIS L.

Very common both in moist and in dry thickets and among the scattered patches of bayberry and mixed growth on the open plains. Not yet in bloom June 27, 1910; cymes whitening June 30, 1912, the first open flowers July 4, in showy bloom July 10; still some flowers August 4, 1906; fruiting well September, 1907.

VIBURNUM DENTATUM L.

In swampy thickets, as well as in dry places, and even in pine barrens; often growing with *V. venosum*, but much less abundant and blooming somewhat earlier. Cymes close and green June 7, 1908; just in flower June 22, 1910; bearing green fruit, no flowers

remaining, July 12, 1912. In the autumns when I have observed it it has fruited much less freely than *V. venosum*.

VIBURNUM VENOSUM Britton.

A noteworthy shrub of Nantucket abounding throughout in damp thickets, on dry banks and in open ground; also in pine barrens. Cymes small and green June 7, 1908; forward bushes just in flower June 30, 1912, everywhere in showy bloom July 4 to 13, and later; fruiting abundantly in September.

The leaves show great diversity of size and form, even in shrubs growing side by side, and the fruit is no less variable, sometimes globose, again oval and somewhat pointed. The largest shrubs seen measured 22 cm. around the trunk near the base and were over 3.5 m. in height. The type of this fine shrub was collected on Nantucket, September 19, 1899. It occurs also on Tuckernuck, and is much more common on Martha's Vineyard than *V. dentatum* which it replaces completely on Chappaquiddick Island.

Reported in Mrs. Owen's list under the name *V. molle* Michx.

*TRIOSTEUM PERFOLIATUM L.

Another native plant that has been found only at a single station on Nantucket—at the foot of a steep thicketed bank by a small pond near Acquidness Point. Here, on September 11, 1907, were two strong clusters not two feet apart consisting together of about twenty stems. Two years later it was seen that these plants were succumbing to the closer pressure of the investing woody growth, and in 1911, when I last visited them, one group had been reduced to three, the other to six weakened stems. In 1910 the plants had still been able to bloom, but bore flowers with light yellow corollas instead of the normal red ones they had produced in their days of vigor. Flower buds just visible June 2, 1909; nearly open June 7, 1908; in full bloom June 19, 1910.

LINNAEA AMERICANA Forbes.

Mrs. Owen says of this plant: "A patch 15–20 feet in diameter discovered in the pines in 1868 or 1869 by Mr. L. L. Dame. A patch in the pines on the South Shore road discovered in 1872 by Miss C. L. Tallant." At the latter locality the plants were seen not more than two years, and Mr. Dame looked in vain for

his plants in 1886. Mr. Floyd writes me that "Mrs. Owen told me not very long before her death that the plant still persisted at one station on Nantucket."

*SYMPHORICARPOS SYMPHORICARPOS (L.) MacM.

Symphoricarpos vulgaris Michx.

"Road opposite Barzilliai Coffin farm September 1, 1912, in full flower. Miss Grace Brown Gardner."

*LONICERA JAPONICA Thunb.

Occasional by fence rows and roadsides in the general town region, less often by fieldsides and the borders of meadows. In full flower June 27, 1912.

CUCURBITACEAE

MICRAMPELIS LOBATA (Michx.) Greene.

Occasional in waste places in and near the town. In full flower late in August.

SICYOS ANGULATUS L.

At a few places in damp lots and by fences in the town; by the railroad in Washington street.

CAMPANULACEAE

*CAMPANULA RAPUNCULOIDES L.

Occasional by street sides and in waste ground in the town, more rarely by roadsides in the suburbs. First flowers June 27, 1910, June 29, 1912; in full bloom at the end of August, 1904.

SPECULARIA PERFOLIATA L.

Rare: Acquidness Point, knoll and hillside thicket east of Shimmo farm, June 7, 1911; Rattlesnake bank, July 1, 1912. Only a few plants at each station and no petaliferous flowers.

LOBELIACEAE

LOBELIA CARDINALIS L.

A few plants along Watt's Run September 6, 1904, and much of it in flaming bloom at the same locality September 17, 1907; Quaise and Polpis, M. L. O.

Note.—Lobelia inflata L. is included in Mrs. Owen's catalogue. Nothing is known of it as a Nantucket plant at the present day, nor have I seen it on Martha's Vineyard.

Notes on Michigan Liliaceae*

OLIVER ATKINS FARWELL

(WITH PLATE 20)

NEW VARIETIES OF ALLIUM CANADENSE

In Michigan there are three well-defined races or varieties of the common wild garlic, *Allium canadense* L. The type, with narrow leaves and numerous, small, ovoid, whitish, obtuse or acutish bulblets in the simple umbel; a form with noticeably broader leaves but with fewer, larger, long-acuminate bulblets which are red at maturity; and a larger, glaucous, form with more fleshy leaves, often with two or three sessile, contiguous umbels, which bear a larger number of obovoid or nearly spherical bulblets of a yellowish white color. There is such a marked difference in the appearance of these forms, at least in the living state, that it seems advisable to name them and place them on record.

Allium canadense ovoideum var. nov.

Bulb ovoid, about 19 mm. long, outer coats fibrous-reticulated, 5–8 cm. below the surface; plant 3–4 dm. high, green, with four or five leaves near the base, these equalling the scape or a little shorter; umbel terminal, mostly of a few, twelve or less, large, ovoid-acuminate, sessile bulblets with or without a few long-pedicelled flowers and some secondary umbels of one to three bulblets, on long rays 5–10 cm. long; involucre of one to three ovate, acuminate, scarious bracts, 2.5–4 cm. long; bulblets of the umbel gradually tapering from a broad base, the larger about 22 mm. in length, mostly rose colored at maturity; generally there are no flowers but some umbels may have from one to four, and occasionally there may be one in one of the umbellets; the flowers are pale purple, on pedicels 5 cm. in length, 8 mm. across when open, 5–6 mm. high; segments acute, the outer narrowly ovate, the inner oblong or linear.

On wet banks in open fields. MICHIGAN: near Rochester, June 11, 1914, *Farwell 3667*.

* Contributions to the Botany of Michigan, No. 12.

Differs from the typical form of the species in its large long-acuminate, rose-colored bulblets, in the narrower perianth-segments and longer pedicels.

Allium canadense robustum var. nov.

Bulb spherical or nearly so, 2.5 cm. in diameter or less, the outer coats fibrous-reticulated, deep-seated, 15–18 cm. below the surface; scapes, often two, 3–4.5 dm. in height, 6 mm. or less in diameter, and, with the two to six leaves near the base, glaucous; leaves rather fleshy, 6 mm. wide, channelled above, convex below, two thirds to three fourths the length of the scape; scape bearing one to three sessile, contiguous umbels, mostly of bulblets, at its apex with one or more rays, 12.5 cm. or less in length, each bearing an umbellet of from one to three bulblets; bulblets often foliaceous, from spherical or nearly so to obovoid, tipped with a minute curved point, the larger about 12 mm. in longest diameter, very numerous, often more than thirty, yellowish white; involucre one to four ovate, acuminate scarious bracts, the acumination often prolonged to a length of 7.5 cm.; flowers, when present, few, on pedicels 19–38 mm. long, white or pale rose, 7 mm. high, 10 mm. across when open, segments obtuse, the outer ovate, the inner oval or obovate.

In rather moist meadow lands. MICHIGAN: near Rochester, June 9, 1912, *Farwell 2629;* June 13, 1912, *Farwell 2729;* June 11, 1914, *Farwell 3666.*

Differs from the typical form of the species in its more robust habit, compound umbel with differently shaped bulblets, obtuse petals and general glaucousness. Listed as *Allium rubrum* Osterhaut? in Rpt. Michigan Acad. Sci. **15**: 169. Nov. 1913.

NEW SPECIES OF LILIUM

I have long considered that the wild red lily of the middle west is specifically distinct from the yellow-flowered *Lilium canadense* L. of the Atlantic seaboard.

Our plant is much taller and coarser; the flowers generally are strongly revolute and red instead of yellow; if the two plants were specifically the same, it would be reasonable to expect to see a yellow-flowered individual at times in the middle west but such has never come under my observation during the twenty-five years I have been observing these plants. I had become so thoroughly

imbued with the idea that our red lily of the middle west was the true *Lilium canadense* that when I first saw the smaller, yellow-flowered lily east of the Appalachians, from the window of a slowly moving train, I was unable to recognize it as of that species, it appeared to be so radically different from my conception of what *Lilium canadense* should be. The red-flowered plant is unquestionably a distinct species.

Lilium michiganense sp. nov.

Leaves remotely whorled, six to ten in a whorl, three- to seven-nerved and rough on the nerves beneath as well as on the margins, lanceolate (12 mm. wide by 9 cm. long) to ovate-lanceolate (19 mm. wide by 4.5 cm. long); flowers in a pyramidal cluster (two to four axial from the uppermost whorl and about four racemosely disposed on the terminal portion of the stem), the peduncles 10–12 cm. long, often bearing a foliaceous bract near the middle.

MICHIGAN: Wiard's Crossing, July 9, 1910, *Farwell 2162½*.

Similar to *L. canadense* in foliage and to *L. superbum* in its flowers, which are of a beautiful orange-red, copiously spotted inside with purplish brown or crimson spots. The upper leaves of this plant are often smooth on the veins beneath, a transition to *L. superbum*, which, though credited to Michigan, I have not yet detected here. The new species occurs in three well-defined forms, and I have taken the most highly developed form, although not the commonest, as the type.

Lilium michiganense umbelliferum var. nov.

Differs in having the stem end abruptly at the uppermost node, the inflorescence being composed of an umbel only, of from two to five flowers, from the axils of the leaves of the uppermost node.

MICHIGAN: Wiard's Crossing, July 9, 1910, *Farwell 2162⅓*; Birmingham, September 7, 1903, *Farwell 1261c;* Belle Isle, July 16, 1892, *Farwell 1261;* Palmer Park, July 16, 1902, *Farwell 1261b;* Rochester, July 4, 1896, *Farwell 1261a*.

Lilium michiganense uniflorum var. nov.

The simplest form, in which the stem is continued beyond the uppermost whorl of leaves and bears a single, nodding flower.

MICHIGAN: Wiard's Crossing, July 9, 1910, *Farwell 2162¼*;

Rochester, July 14, 1912, *Farwell 2848;* Parkedale Farm, October 5, 1913, *Farwell 3523;* Rochester, July 14, 1913, *Farwell 2848.*

It is a misnomer to call *L. michiganense*, as is usually done here, "the wild yellow lily" as the flowers are never yellow; the buds are at first green, then yellow (some, however, never show any sign of yellow externally), and finally red; the flowers when opened are orange-red externally and on the blade internally, the midvein being orange-yellow, the claw pale yellow or whitish and copiously blotched with crimson spots which extend upward on the blade for one half to two thirds its length. I have included in this species certain forms in which the buds show no yellow color, and the flower has brownish purple instead of crimson spots with orange-red extending down the claw, but in which the leaves are characteristic. Further study may prove these forms to be distinct. The segments are recurved to below the middle, often spirally coiled, so that the apex is again ascending.

Lilium peramoenum sp. nov.

Similar to *L. michiganense*, but the leaves are more numerous, eight to sixteen in a whorl, with a corresponding increase in the number of flowers in the inflorescence; the flowers are orange-red throughout, dotted with copious but smaller spots; the leaves are narrower, linear-lanceolate, 10 mm. wide by 9 cm. long to oblong-lanceolate 15 mm. wide by 7 cm. long.

MICHIGAN: Parkedale Farm, July 19, 1914, *Farwell 3726.* Elder thickets in rich muck lands. *L. michiganense* is found usually in poorer soil though it may be in dry fields and on banks or in wet swamps and meadows. Both species range from 1–2 m. in height.

NOTES ON UNIFOLIUM BIFOLIUM

In Rhodora for December, 1914, Mr. Fernald describes a pubescent form of *Maianthemum canadense* as a new variety (var. *interius*) and gives its range from Illinois north and northwestward into Canada. He had not seen this pubescent form east of Illinois or Wisconsin. The late Mr. G. H. Hicks collected it at Owosso, Michigan, in 1889, and I found it at Stoney Creek, Michigan, in 1913. Both stations are in the southeastern part of the state, about sixty miles apart.

A careful study of a series of specimens, ranging from Oregon to Hungary, allows of but one conclusion—that there is but a single species and that the plant recently described by Mr. Fernald as *Maianthemum canadense* var. *interius*, is, in reality, identical with the Linnean *Convallaria bifolia* and is, consequently, *Unifolium bifolium* (L.) Greene. The plant from the Black Hills, FIGS. 7, 8, it will be observed, corresponds with that from Denmark, FIG. 6; the collections of Mr. Hicks, FIGS. 9, 10, are nearly identical with those from Hungary and Bavaria, FIGS. 1, 2; and my own collection from Stoney Creek, FIG. 11, is very close to another plant, FIG. 3, from Bavaria; the outlines of the leaves of the var. *canadense*, FIGS. 12–19, are the same as those of the type, no other difference, save that of pubescence, being detectable; the apex in both is acute or obtuse, the base cordate or sagittate; the western variety *kamtschaticum*, FIGS. 22, 23, shows the broadest sinus; the European type, the deepest; the var. *canadense*, the shallowest; and the var. *ovale*, FIGS. 20, 21, the narrowest; but there is a regular graduation from one extreme to another. The var. *kamtschaticum* has the longest petiole with the blade prominently decurrent on it; the plants of Loher, FIG. 3, and Cavassius, FIG. 4, show the blades slightly decurrent on the petioles, thus in a measure paralleling the western form. The pedicels vary from 2–6 mm. in length in all the forms; the petioles of the upper leaf measure 1–6 mm., and of the lower leaf, 2–16 mm., in all the forms except the western, which has much longer petioles. There is in Michigan a plant with broadly ovate or oval leaves, FIGS. 20 (stem-leaf), 21 (root-leaf); Pursh traversed the region of "the Lesser and Great Lakes" and I have no doubt that this form is the basis of his *Smilacina canadensis* var. *ovalis;* the base of the leaf is cordate or rather sagittate but the sinus is closed or nearly so, which renders it inconspicuous. There is a form which has three leaves to the stem and in Europe forms are found with but one leaf. The differences in length of petioles, pedicels, and the size of the leaf-sinus cannot be correlated with other characters with a sufficient degree of accuracy to warrant separating the different forms as species; such differences as exist are of degree and not of kind and therefore are not of specific value. The species and its forms may be listed as follows:

UNIFOLIUM BIFOLIUM (L.) Greene

Maianthemum canadense var. *interius* Fernald, Rhodora **16**: 211. 1914.

MICHIGAN: Owosso, May 21, 1889, *G. H. Hicks;* Stoney Creek, May 25, 1913, *Farwell 3412.* Illinois westward to the Black Hills and northward into Canada; also in Europe.

Unifolium bifolium monophyllum forma nov.

Differs from the species only in having but one leaf on the stem. SWEDEN: Moheda, *C. G. H. Cavassius*, in the herbarium of Parke, Davis & Company.

Unifolium bifolium canadense (Desf.) comb. nov.

Maianthemum canadense Desf. Ann. Mus. Paris **9**: 54. 1807.
Convallaria bifolia var. *canadensis* Poir. Enc. **4**: 371. 1816.
MICHIGAN: Detroit, May 9, 1895, *Farwell 379a;* Algonac, September 13, 1914, *Farwell 3898.* From Michigan eastward, ranging north to Newfoundland and south to the Carolinas.

Unifolium bifolium trifolium (Pursh) comb. nov.

Smilacina canadensis γ *trifolia* Pursh, Fl. Am. Sept. 233. 1814.
The stem has three leaves, otherwise like the variety *canadense*.
MICHIGAN: Detroit, May 9, 1895, *Farwell 379b.*

Unifolium bifolium ovale (Pursh) comb. nov.

Smilacina canadensis β *ovalis* Pursh, Fl. Am. Sept. 233. 1814.
I here adopt Pursh's varietal name for the form in the Lake Superior district, with broadly ovate or oval leaves.
MICHIGAN: Keweenaw Peninsula, June, 1886, *Farwell 379;* October, 1914, *Farwell.*

UNIFOLIUM BIFOLIUM KAMTSCHATICUM (Gmel.) Piper

California to Idaho and Alaska; also Siberia.

NOTES ON VAGNERA

VAGNERA STELLATA (L.) Morong

The common woodland form, 3–4.5 dm. in height, bearing seven to twelve leaves with a short, harsh pubescence on the veins on the lower surface, becoming, with age, glabrate or smooth, at least to the touch.

MICHIGAN: Ypsilanti, May 29, 1891, *Farwell 1121;* Parkedale Farm, May 19, 1912, *Farwell 2567;* Rochester, June 28, 1914, *Farwell 3699.*

This I take to be the typical form of the species. There is a wide range in the size of the plant and leaves, in the pubescence, and in the habitat of this species; the rhizome seems to vary in size correspondingly; the fruit, while young, is green; but as it approaches maturity it becomes purple on the angles; then intermediate lines of a paler color appear; later it is finely lined or spotted and ultimately becomes a ruby red as in *V. racemosa* and the other species of the genus. Fruit, however, in this species is a rarity; most of the flowers are sterile and drop from their pedicels at an early stage as though the plant were of hybrid origin; if such is the case the parents probably are *V. racemosa* and *V. trifolia.*

Vagnera stellata mollis var. nov.

Differs from the typical form of the species in having the leaves densely and permanently velvety pubescent all over the lower surface; in the more numerous leaves, six to fourteen, 1–5 cm. wide and 3.5–20 cm. long; plant often larger, attaining a height of nearly 1 m., but sometimes smaller and not exceeding 18 cm.

MICHIGAN: Parkedale Farm, May 30, June 11, and July 4, 1914, *Farwell 3651, 3669½, 3720½;* growing in muck lands, on barren hilltops, and in *Sphagnum,* in the order named. SOUTH DAKOTA: Black Hills, *W. S. Rusby.*

The habitat of the variety is as variable as that of the typical form. The plants growing in *Sphagnum* are the smallest but seem to perfect fruit more readily than those in other situations; those growing in rich muck in elder thickets are the largest and do not perfect fruit at all; the plant does not disdain the exposed tops and sides of more or less barren hills but fruit is seldom seen in such localities. With all its variableness, however, the soft velvety pubescence of the plant remains constant.

VAGNERA TRIFOLIA (L.) Morong

This species and *Unifolium bifolium* are locally known as wild lily-of-the-valley. In the Lake Superior region of Michigan both are quite common. Besides the ordinary three-leaved form of *V. trifolia* there are two others that are frequently met with; one has two leaves to the stem, and the other, one leaf. These may be recorded as follows:

Vagnera trifolia bifolia forma nov.

A form with two leaves on the stem.

MICHIGAN: Keweenaw Peninsula, June 16, 1886, *Farwell 378a.*

Vagnera trifolia unifolia forma nov.

A form with only one leaf on the stem.

MICHIGAN: Keweenaw Peninsula, June 16, 1886, *Farwell 378b.*

DEPARTMENT OF BOTANY,
PARKE, DAVIS & COMPANY,
DETROIT, MICHIGAN.

Explanation of plate 20

FIGS. 1–11. UNIFOLIUM BIFOLIUM (L.) Greene

1. Pressburg, Hungary, *Richter.* 2. Woods near Munich, Germany, May, 1891, *C. J. Mayer.* 3. Woods near Munich, Germany, May, 1887, *Loher.* 4. Moheda, Sweden, *C. G. H. Cavassius.* 5. Same locality and collector (forma *monophyllum*). 6. Lyngby, Denmark, June, 1865, *J. Lange.* 7, 8. Black Hills, South Dakota, *W. S. Rusby,* 9, 10. Owosso, Michigan, May 21, 1889, *G. H. Hicks.* 11. Stoney Creek, Michigan, *Farwell 3412.*

FIGS. 12–19. UNIFOLIUM BIFOLIUM CANADENSE (Desf.) Farwell

12–14. Westfield, Massachusetts, May 29, 1873, *H. H. Rusby.* 15. East Greenwich, New York, 1867, *A. Fitch.* 16, 19. Algonac, Michigan, September 13, 1914, *Farwell 3898.* 17, 18. Detroit, Michigan, May 9, 1893, *Farwell 379a.*

FIGS. 20, 21. UNIFOLIUM BIFOLIUM OVALE (Pursh) Farwell

20. Lower leaf; Kewenaw Peninsula, Michigan, June 16, 1886, *Farwell 379.* 21. Root leaf; same locality and collector, October, 1914.

FIGS. 22, 23. UNIFOLIUM BIFOLIUM KAMTSCHATICUM (Gmel.) Piper

22. Lower leaf; Cascades of the Columbia River, Washington, June 3, 1882, *W. N. Suksdorf 23.* Upper leaf; same locality, collector, and date.

FIGS. 1–8, 12–15, 22, and 23 were drawn from specimens in the herbarium of Parke, Davis & Company; the remaining figures, from specimens in the herbarium of the writer. All are reduced one half.

INDEX TO AMERICAN BOTANICAL LITERATURE

1908–1915

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

This Index is reprinted monthly on cards, and furnished in this form to subscribers at the rate of one cent for each card. Selections of cards are not permitted; each subscriber must take all cards published during the term of his subscription. Correspondence relating to the card issue should be addressed to the Treasurer of the Torrey Botanical Club.

Arthur, J. C. Cultures of Uredineae in 1912, 1913 and 1914. Mycologia **7**: 61–89. Mr 1915.

Balthis, F. K. An Illinois school campus. Am. Bot. **21**: 1–8. F 1914. [Illust.]

Barbour, E. H. Plant tissue in the carboniferous shales of Nebraska. Nebraska Geol. Surv. **4**: 231, 232. *f. 1.* 30 N 1914.

Bartlett, H. H. The mutations of *Oenothera stenomeres*. Am. Jour. Bot. **2**: 100–109. *f. 1–4.* F 1915.

Bartlett, H. H. The source of the drug *Dioscorea*, with a consideration of the Dioscoreae found in the United States. U. S. Dept. Agr. Plant. Ind. Bull. 189: 1–25. *f. 1–8.* 11 N 1910.

Bartlett, H. H. Systematic studies on *Oenothera*,—V. *Oe. Robinsonii* and *Oe. cleistantha*, spp. novv. Rhodora **17**: 41–44. *pl. 111.* 17 Mr 1915.

Beal, W. J. Weeds growing in Amherst. Rhodora **17**: 29, 30. 6 F 1915.

Blake, S. F. *Moneses uniflora* var. *reticulata*. Rhodora **17**: 28, 29. 6 F 1915.

Bovie, W. T. A simplified precision auxanometer. Am. Jour. Bot. **2**: 95–99. *f. 1–3.* F 1915.

Brown, H. P. Growth studies in forest trees. 2. *Pinus Strobus.* Bot. Gaz. **59**: 197–241. *pl. 13, 14+f. 1, 2.* 17 Mr 1915.

Buchtien, O. Contribuciones a la flora de Bolivia. Parte I. 1–197. La Paz. 1910.

Burnham, S. H. A visit to the Saratoga battlefield. Am. Bot. **21**: 19–21. F 1915.

Buswell, W. H. A winter flora of a mountain top. Am. Bot. **21**: 9–11. F 1915.

Castillo, L., & Dey, J. Jeografia vejetal del Rio Valdivia i sus inmediaciones. 1–120. *f. 1–64.* 1908.

Clute, W. N. Insects and the color of flowers. Am. Bot. **21**: 15–17. F 1915. [Illust.]

Collins, F. S. November flowers. Rhodora **17**: 33–38. 17 Mr 1915.

Conard, H. S. The structure and development of *Secotium agaricoides.* Mycologia **7**: 94–104. *pl. 157+f. 1.* Mr 1915.

Connolly, C. J. Beiträge zur Kenntnis einiger Florideen. Flora **103**: 125–170. *pl. 1, 2+f. 1–24.* 11 Jl 1911.

Cook, O. F. Date palm allies in America. Jour. Heredity **6**: 117–122. *f. 8–10.* 25 F 1915.

Curtis, O. F., & Colley, R. H. Picro-nigrosin, a combination fixative and stain for algae. Am. Jour. Bot. **2**: 89–92. F 1915.

Davidson, J. Second annual report of the botanical office. Second Ann. Rep. Bot. Office British Columbia **1**: O 35–O 76. *f. 38–61.* 1915.

Fernald, M. L. The North American representatives of *Dryopteris spinulosa* var. *dilatata.* Rhodora **17**: 44–48. 17 Mr 1915.

Fernald, M. L. Some new or unrecorded Compositae chiefly of northeastern America. Rhodora **17**: 1–20. 6 F 1915.

Includes seven new species in *Solidago* (4), *Aster* (2) and *Arnica* (1).

Fernald, M. L., & St. John, H. Some anomalous species and varieties of *Bidens* in eastern North America. Rhodora **17**: 20–25. 6 F 1915.

Describes *Bidens colpophila* sp. nov.

Fink, B. William Wirt Calkins, amateur mycologist. Mycologia **7**: 57–61. *pl. 154.* Mr 1915.

Fletcher, E. F. Two more foreign plants found on wool-waste at Westford. Rhodora **17**: 32. 6 F 1915.

Fromme, F. D. Negative heliotropism of urediniospore germ-tubes. Am. Jour. Bot. **2**: 82–85. *f. 1, 2.*. F 1915.

Frothingham, E. H. The eastern hemlock (*Tsuga canadensis* (Linn.) Carr). U. S. Dept. Agr. Bull. 152: 1–43. *pl. 1–5+f. 1–3.* 3 F 1915.

Gates, F. C. A woody stem in *Merremia gemella* induced by high warm water. Am. Jour. Bot. **2**: 86–88. *f. 1, 2.* F 1915.

Gates, R. R. On the nature of mutations. Jour. Heredity **6**: 99–108. *f. 1–7.* 25 F 1915.

Gormley, R. Onagraceae of Ohio. Ohio Nat. **15**: 463–468. 12 Mr 1915.

Greenman, J. M. Descriptions of North American Senecioneae. Ann. Missouri Bot. Gard. **1**: 263–290. *pl. 10–14.* 30 S 1914.

Griffiths, D. Hardier spineless cactus. Jour. Heredity **6**: 182–191. *f. 15–19.* 25 Mr 1915.

Harter, L. L. Notes on the distribution and prevalence of three important sweet potato diseases. Phytopathology **5**: 124–126. Ap 1915.

Hasselbring, H. Effectos de la sombra sobre la transpiración y la asimilación de la planta del tabaco en Cuba. Cuba Estac. Exp. Agron. Bull. **24**: 1–38. F 1915.

Hasselbring, H. Tipos de tabaco cubano. Cuba Estac. Exp. Agron. Bull. **23**: 1–15. *pl. 1–7.* Ja 1915.

Hasse, H. E. Additions to the lichen-flora of southern California. No. 10. Bryologist **18**: 22, 23. Mr 1915.

Hawkins, L. A. Some effects of the brown-rot fungus upon the composition of the peach. Am. Jour. Bot. **2**: 71–81. F 1915.

Haynes, C. C. Hepaticae collected in Florida by Severin Rapp. Bryologist **18**: 19–22. Mr 1915.

Heald, F. D., Gardner, M. W., & Studhalter, R. A. Air and wind dissemination of asco[s]pores of the chestnut-blight fungus. Jour. Agr. Research **3**: 493–526. *pl. 63–65+f. 1, 2.* 25 Mr 1915.

Holden, R. On the relation between *Cycadites* and *Pseudocycas*. New Phytologist **13**: 334–340. *pl. 3+f. 1.* D 1914.

Jensen, J. Dendrologische Beobachtungen in dem Gebiete am Kopfe des Michigansees. Mitteil. Deuts. Dend. Gesells. **1914**: 184–188. 23 N 1914.

Jones, L. R., & Gilbert, W. W. Lightning injury to potato and cotton plants. Phytopathology **5**: 94–102. *pl. 8, 9.* Ap 1915.

Lipman, C. B. A suggestion of a new phase of the problem of physiological diseases of plants. Phytopathology **5**: 111–116. Ap 1915.

Lloyd, C. G. Letter No. 55. 1–4. *f. 627.* Cincinnati. Mr 1915.
Includes a note on *Polyporus (Ganodermus) gibbosus.*

Lloyd, C. G. Synopsis of the *Cordyceps* of Australasia. 1–11. *f. 611–626.* Cincinnati. Mr 1915.

Lloyd, C. G. Synopsis of the genus *Fomes.* 211–288. *f. 570–610.* Cincinnati. Ja 1915.

Lorenz, A. List of Hepaticae to be expected in New England. Bryologist **18**: 24–26. Mr 1915.

Merrill, G. K. *Lecanora atrosanguinea* Merrill and *Blastenia Herrei* Hasse identical. Rhodora **18**: 29. 17 Mr 1915.

Monnet, P. Contributions a l'étude de la végétation du Grand Bassin Américain. Rev. Gén. Bot. **26**: 342–349. *pl. 9–12.* 15 Au 1914.

Murrill, W. A. The genus *Lepista.* Mycologia **7**: 105–107. Mr 1915.

Murrill, W. A. Marking types in the mycological herbarium. Mycologia **7**: 108. Mr 1915.

Orton, W. A. Environmental influences in the pathology of *Solanum tuberosum.* Jour. Washington Acad. Sci. **3**: 180–190. *f. 1–3.* 4 Ap 1913.

Osterhout, W. J. V. Extreme alterations of permeability without injury. Bot. Gaz. **59**: 242–253. *f. 1–4.* 17 Mr 1915.

Osterhout, W. J. V. Normal and abnormal permeability. Am. Jour. Bot. **2**: 93, 94. F 1915.

Pepperberg, R. V. Preliminary notes on the carboniferous flora of Nebraska. Nebraska Geol. Surv. **3**: 313–329. *pl. 1–12.* Jl 1910.

Perkins, L. S. The pomerange. Jour. Heredity **6**: 192. 25 Mr 1915.
A natural hybrid between the orange and pomelo.

Piper, C. V. *Andropogon halepensis* and *Andropogon sorghum.* Proc. Biol. Soc. Washington **28**: 25–44. 12 Mr 1915.

Prescott, A. The spinulose shield fern. Am. Bot. **21**: 17, 18. F 1915.

Reimer, F. C. Blight resistance in pears and pear stocks. Monthly Bull. State Com. Hort. Calif. 4: 145–149. *f. 23.* Mr 1915.

Rehder, A. Einige neuere oder kritische Gehölze. Mitteil. Deuts. Dend. Gesells. **1914**: 257–263. 23 N 1914.

Richardson, A. E. V. Wheat breeding. Jour. Heredity **6**: 123–141. *f. 11–19.* 25 F 1915.

Riddle, L. W. An undescribed species of *Cetraria.* Bryologist **18**: 27, 28. Mr 1915.
Cetraria pallidula Tuckerman.

Rolfe, R. A. *Mormodes tigrinum.* Curt. Bot. Mag. **11**: *pl. 8597.* F 1915.

Rolfs, P. H. Tomato diseases. Florida Agr. Exp. Sta. Bull. 117: 37–48. *f. 4, 5.* N 1913.

Rorer, J. B. Bud-rot of the cocoanut palm. Dept. Agr. Trinidad and Tobago Bull. 11: 68, 69. 1912.

Rorer, J. B. Some fruit diseases. Dept. Agr. Trinidad and Tobago Bull. 11: 75, 76. 1912.

Sargent, C. S. Three of Clayton's oaks in the British Museum. Rhodora **17**: 39, 40. 17 Mr 1915.

Saunders, C. F. A garden of associations. Am. Bot. **21**: 12–14. F 1915.

Schaffner, J. H. Peculiar varieties of *Amaranthus retroflexus.* Ohio Nat. **15**: 469–471. *f. 1.* 12 Mr 1915.

Seaver, F. J. Photographs and descriptions of cup-fungi—I. *Peziza.* Mycologia **7**: 90–93. *pl. 155, 156.* Mr 1915.

Shear, C. L. Mycology in relation to phytopathology. Science II. **41**: 479–484. 2 Ap 1915.

Sherman, L., & Schier, W. E. Field record of the Wisconsin Mycological Society for the seasons of 1912, 1913, and 1914. [Milwaukee.] [1–4.] [1915.]

Shreve, F. The direct effects of rainfall on hygrophilous vegetation. Jour. Ecology **2**: 82–98. *pl. 14.* Je 1914.

Smith, R. E. The investigation of "physiological" plant diseases. Phytopathology **5**: 83–93. Ap 1915.

Smith, R. E., & Boncquet, A. New light on curly top of the sugar beet. Phytopathology **5**: 103–107. *f. 1–3.* Ap 1915.

Stapf, O. *Pinguicula gypsicola.* Curt. Bot. Mag. **11**: *pl. 8602.* Mr 1915.
A plant from Mexico.

Steil, W. N. Apogamy in *Nephrodium hirtipes.* Bot. Gaz. **59**: 254–255. 17 Mr 1915.
Preliminary note.

Stevens, F. L. Some problems of plant pathology in reference to transportation. Phytopathology **5**: 108–110. Ap 1915.

Stewart, V. B., & Leonard, M. D. The rôle of sucking insects in the dissemination of fire blight bacteria. Phytopathology **5**: 117–123. Ap 1915.

St. John, H. An insular variety of *Solidago sempervirens*. Rhodora **17**: 26, 27. 6 F 1915.

Stuart, W. Group classification and varietal descriptions of some American potatoes. Bull. U. S. Dept. Agr. Professional Paper 176: 1–56. *pl. 1–19*. 27 Mr 1915.

Turrill, W. B. *Eugenia uniflora*. Curt. Bot. Mag. **11**: *pl. 8599*. F 1915.
A plant from tropical South America.

Vries, H. de. The coefficient of mutation in *Oenothera biennis* L. Bot. Gaz. **59**: 169–196. 17 Mr 1915.

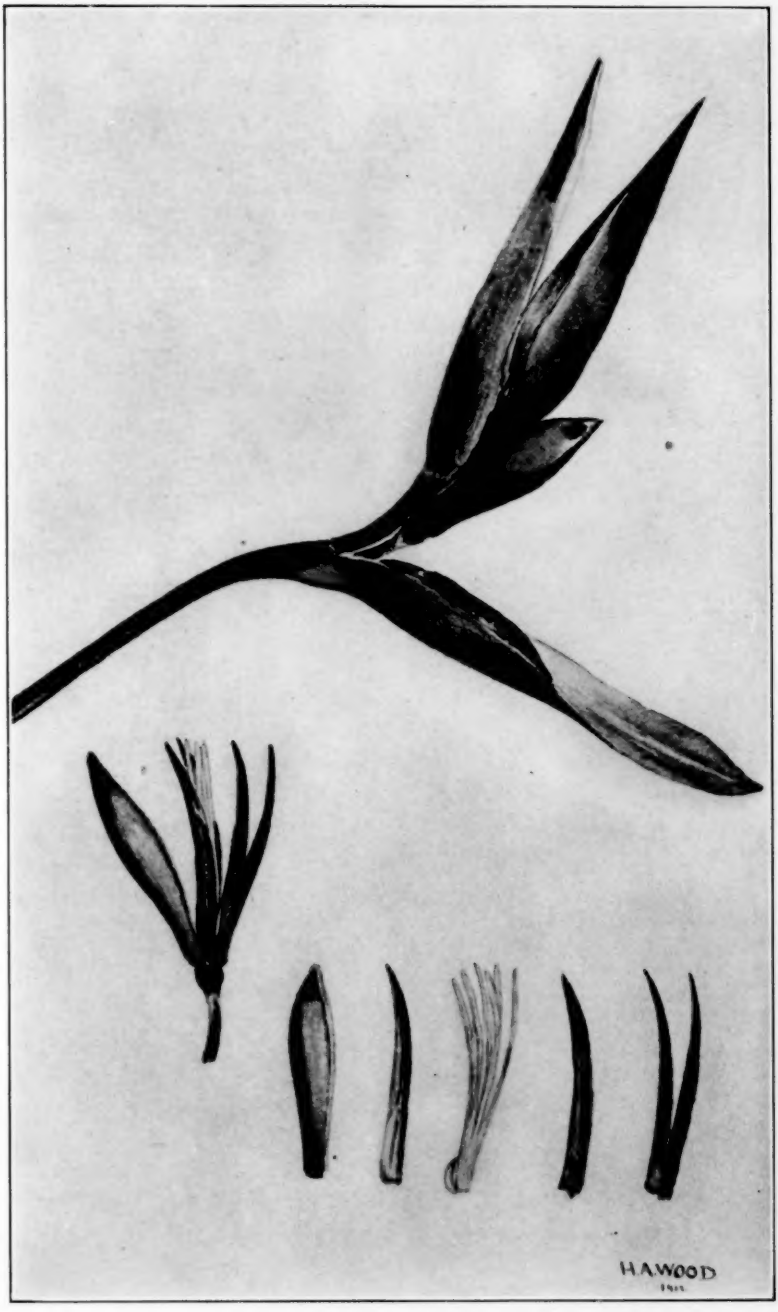
Webster, H. A rash mycophagist. Rhodora **17**: 30–32. 6 F 1915.
A case of poisoning attributed by the author to *Lepiota Mongaric* [Morgani].

Wight, W. F. The varieties of plums derived from native American species. Bull. U. S. Dept. Agr. Prof. Paper 172: 1–44. 13 Mr 1915.

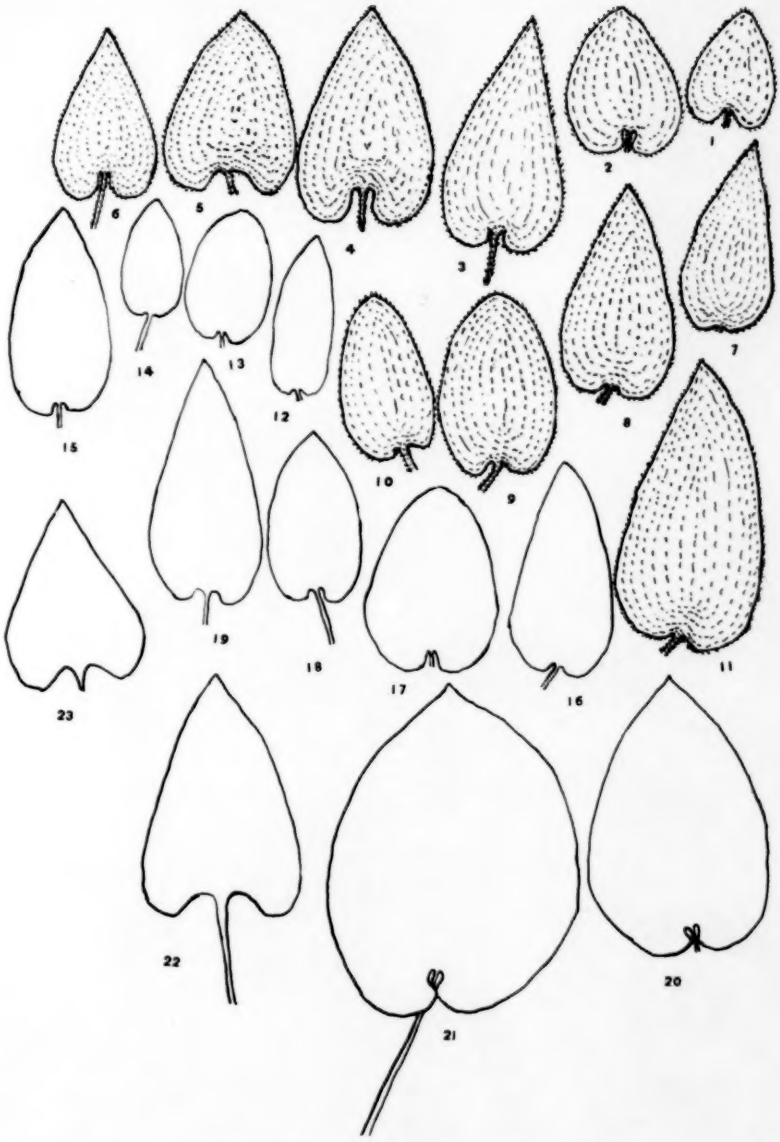
Willis, J. C. On the lack of adaptation in the Tristichaceae and Podostemaceae. Proc. Royal Soc. **87**: 532–550. 1914.

Wooton, E. O. Cacti in New Mexico. New Mexico Agr. Exp. Sta. Bull. 78: 1–70. My 1911. [Illust.]

Wright, C. H. *Tillandsia regina*. Curt. Bot. Mag. **11**: *pl. 8596*. F 1915.
A plant from Brazil.



BIHAI HARRISIANA GRIGGS



UNIFOLIUM BIFOLIUM (L.) GREENE